Forward Air Controller: Task Analysis and Development of Team Training Measures for Close Air Support

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Abstract

The role of the Forward Air Controller (FAC) in Close Air Support (CAS) is critical, as their performance can mean the difference between effective CAS and fratricide. Effective live training opportunities in Canada for FACs are limited as they require large supporting teams (involving among others pilots, the supported commander, higher air command, etc.). Distributed simulation may be a useful tool for generating and sustaining FAC capabilities in the Canadian Forces (CF). However, in order to establish the effectiveness of such training, it is necessary to define the tasks the FAC and the CAS team perform, and to identify suitable metrics for assessing the team's performance.

To this end, a Hierarchical Task Analysis of CAS was performed. The analysis was used to develop a series of Behaviourally Anchored Rating Scales (BARS) that captured team performance in CAS. These BARS were trialed during Exercise Northern Goshawk, a distributed simulation of a joint coalition operation involving research partners from DRDC Toronto, the United States and the United Kingdom. The exercise revealed a number of challenges affecting the application of the instrument as well as the interpretation of the ratings obtained with it. Thus, this report does not provide analysis of the ratings. However, a number of possible solutions to the challenges are discussed. The report also makes a number of recommendations for improving the instrument prior to its application in future distributed simulation exercises. The principal ones are: future raters should be adequately trained on using the instrument, and its inter-rater reliability should be assessed and refined. An improved BARS instrument will aid in the development of effective distributed training simulations in support of FAC capability development in the CF.

Résumé

Le rôle du Contrôleur Aérien Avancé (CAA) dans l'appui aérien rapproché (AAR) est essentiel, puisque son rendement peut faire toute la différence entre l'AAR efficace et le fratricide. Les possibilités d'entraînement efficace en direct au Canada pour les CAA sont limitées puisqu'elles nécessitent de grandes équipes de soutien (auxquelles participent notamment les pilotes, le commandant appuyé, le commandement aérien supérieur, etc.). La simulation répartie peut être un outil utile pour créer et maintenir des capacités de CAA dans les Forces canadiennes (FC). Cependant, afin d'établir l'efficacité d'une telle formation, il est nécessaire de définir les tâches qu'accomplissent le CAA et l'équipe d'AAR, ainsi que de déterminer les mesures adéquates pour évaluer le rendement de l'équipe.

À cette fin, on a effectué une analyse hiérarchique des tâches de l'AAR. L'analyse a été utilisée pour élaborer une série d'échelles d'évaluation fondée sur le comportement (EEFC) conçues pour enregistrer le rendement d'équipe relativement à l'AAR. Ces EEFC ont fait l'objet d'essais pendant l'exercice *Northern Goshawk*, une simulation répartie d'une opération coalisée interarmées à laquelle ont participé des partenaires de recherche de RDDC Toronto, des États-Unis et du Royaume-Uni. L'exercice a révélé un certain nombre de problèmes touchant l'application de l'instrument ainsi que l'interprétation des évaluations que l'on obtient. Le présent rapport ne fournit donc pas d'analyse des évaluations. Toutefois, on y discute de nombreuses solutions possibles. Le rapport présente également un certain nombre de recommandations visant à améliorer l'instrument avant son application aux exercices futurs de simulation répartie. Les recommandations principales sont les suivantes : les évaluateurs futurs doivent suivre une formation adéquate sur l'utilisation de l'instrument, et le coefficient d'objectivité de l'instrument doit être évalué et amélioré. Un instrument EEFC amélioré aidera à l'élaboration de simulations réparties de formation efficaces à l'appui du développement des capacités du CAA dans les FC.

Executive Summary

The role of the Forward Air Controller (FAC) in Close Air Support (CAS) is critical, as their performance can mean the difference between effective CAS and fratricide (Department of National Defence, 2006; Cyr, 2007a; Jarmasz, 2007). The FAC operates as part of a very distributed team, but effective team performance is necessary for the FAC to be successful.

FACs often work with coalition aircraft in theatre, but effective live training opportunities in Canada for such coalition teamwork are lacking. Distributed **s**imulation may provide an effective training solution for generating and sustaining FAC capabilities in the CF. However, in order to establish the effectiveness of such training, it is necessary to define the tasks the FAC and the CAS team (pilot, supported commander, higher air command, etc.) perform, and to identify suitable metrics for assessing the team's performance as a whole. To that end, the contractor constructed hierarchical task analyses for the principal members of this team, the FAC and the pilot, during CAS, validated the task analyses with Subject Matter Experts, identified appropriate measurement points (i.e. when during the FAC's job is it best to measure their performance) that capture elements of team performance during CAS missions and developed Behaviourally Anchored Rating Scales (BARS) that assess team performance.

One hundred BARS that captured team performance were developed and submitted to the SA for review and incorporation into the planning for Exercise Northern Goshawk, a distributed simulation of a joint coalition operation involving allied research partners from the US and the United Kingdom. The contractor and SA then collaborated to revise, to develop 21 additional BARS and combine them all into a rating instrument to be applied during the exercise. The Canadian component of the simulation occurred in the Synthetic Environment Research Facility (SERF) at DRDC Toronto from August 6, 2007 to August 10, 2007.

Exercise Northern Goshawk provided an opportunity to trial this first iteration of the BARS instrument. It revealed a number of challenges affecting the real-time application of the instrument as well as the interpretation of the ratings obtained with it. Thus, this report does not provide analysis of the ratings. However, it lists the challenges that arose and proposes solutions to them.

It is expected that an improved BARS instrument would aid in the development of effective distributed training simulations in support of FAC capability development in the CF. A number of recommendations have been made in order to improve the BARS instrument prior to its application in future distributed simulation exercises. First, it is recommended that each rater be adequately trained to administer the BARS. Second, an inter-rater reliability analysis should be conducted using communications recordings from Exercise Northern Goshawk or other exercises. To do this, two or more raters must review the same event(s) from the exercise(s) and independently apply the same BARS. From these ratings, statistical analyses such as a correlation can be computed to evaluate the strength of the relationship between different raters' ratings. This information can be used as an indicator of BARS that need to be further refined.

Sommaire

Le rôle du Contrôleur Aérien Avancé (CAA) dans l'appui aérien rapproché (AAR) est essentiel, puisque son rendement peut faire toute la différence entre l'AAR efficace et le fratricide (ministère de la Défense nationale, 2006; Cyr, 2007a; Jarmasz, 2007). Le CAA fait partie d'une équipe très répartie, mais le rendement de l'équipe doit être efficace pour que le CAA accomplisse ses fonctions.

Les CAA des FC travaillent souvent avec des aéronefs coalisés, mais il n'y a pas suffisamment de possibilités d'entraînement efficace en direct au Canada pour un tel travail d'équipe. La simulation répartie pourrait être une solution de formation efficace pour créer et conserver des capacités de CAA dans les FC. Cependant, afin d'établir l'efficacité d'une telle formation, il est nécessaire de définir les tâches qu'accomplissent le CAA et l'équipe d'AAR (pilotes, commandant appuyé, commandement aérien supérieur, etc.), et de déterminer les mesures appropriées pour évaluer le rendement global de l'équipe. À cette fin, l'entrepreneur a réalisé une analyse hiérarchique des tâches pour les principaux membres de l'équipe, le CAA et le pilote, pendant l'AAR, validé l'analyse des tâches auprès des experts en la matière, cerné les points de mesure appropriées (c.-à-d. les moment pendant le travail du CAA qui se prêtent le mieux à l'évaluation) qui saisissent les éléments du rendement de l'équipe durant les missions d'AAR et élaboré des échelles d'évaluation fondée sur le comportement (EEFC) qui évaluent le rendement de l'équipe.

Cent EEFC qui saisissent le rendement de l'équipe ont été élaborés et soumis au responsable scientifique aux fins d'examen et d'incorporation dans la planification de l'exercice *Northern Goshawk*, une simulation répartie d'une opération coalisée interarmées à laquelle ont participé des partenaires de recherche alliés des É.-U. et du Royaume-Uni. L'entrepreneur et le responsable scientifique ont ensuite collaboré pour réviser et élaborer 21 EEFC supplémentaires et les combiner toutes dans un instrument d'évaluation à appliquer pendant l'exercice. La composante canadienne de la simulation a eu lieu à l'Installation de recherche sur les environnements synthétiques (IRES) de RDDC Toronto, du 6 au 10 août 2007.

L'exercice *Northern Goshawk* a permis d'essayer cette première version de l'instrument EEFC. On a cerné un certain nombre de problèmes touchant l'application en temps réel de l'instrument ainsi que l'interprétation de l'évaluation obtenue. Par conséquent, le présent rapport ne fournit pas d'analyse des évaluations. Toutefois, on y énumère les problèmes qui sont survenus et on propose des solutions.

On prévoit qu'un instrument EEFC amélioré aidera à élaborer des simulations réparties efficaces de formation à l'appui du développement des capacités du CAA dans les FC. Un certain nombre de recommandations ont été faites en vue d'améliorer l'instrument EEFC avant son application aux exercices futurs de simulation répartie. D'abord, on recommande que chaque évaluateur suive une formation adéquate pour administrer l'EEFC. Ensuite, une analyse du coefficient d'objectivité doit être réalisée à l'aide des enregistrements de communications de l'exercice *Northern Goshawk* ou d'autres exercices. Pour ce faire, au moins deux évaluateurs doivent évaluer le même événement de l'exercice et appliquer indépendamment la même EEFC. À partir de ces évaluations, une analyse statistique, telle qu'une corrélation, peut être calculée pour évaluer la force du lien entre les évaluations des évaluateurs différents. L'information peut être utilisée comme indicateur des EEFC qui doivent être améliorées davantage.

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A/C	AirCraft
A-10	Thunderbolt II Aircraft (aka Warthog)
AAR	Air-to-Air Refuelling
ACO	Air Control Order
ALO	Air Liaison Officer
ANA	Afghanistan National Army
ANP	Afghanistan National Police
AO	Area of Operations
ASOC	Air Support Operations Centre
ATO	Air Tasking Order
AWACS	Airborne Warning And Control System
BAI	Battlefield Air Interdiction
BARS	Behaviourally Anchored Rating Scale
BDA	Battle Damage Assessment
BP	Battle Position
Bty 2 I/C	Battery Second In-Command
CAS	Close Air Support
Cdr	Commander
CF	Canadian Forces
COA	Course Of Action
CONOP	CONcept of Operations
Coy	Company
CP	Contact Point
CRM	Crew Resource Management
CSAR	Combat Search and Rescue
DAGR	Defence Advanced GPS Receiver
DRDC	Defence Research Development Canada
FAC	Forward Air Controller
FAC(A)	Forward Air Controller (Airborne)

FEBA	Forward Edge of Battlefield Activity
FLOT	Forward Line of Own Troops
FOO	Forward Observation Officers
FSCC	Fire Support Control Centre
GLO	Ground Liaison Officer
GLTD	Ground Laser Target Designator
HTA	Hierarchical Task Analysis
IFF	Identify Friend Foe
INTEL	Intelligence
INTREP	INTelligence REPort
IP	Initial Point
IR	InfraRed
ISR	Intelligence Surveillance and Reconnaissance
JFIRE	Joint Application of Firepower
LAV	Light Armoured Vehicle
LRF	Laser Range Finder
LTM	Laser Target Marker
MDC	Mission Data Card
MEDEVAC	MEDical EVACuation
MISREP	MISsion REPort
MLRS	Multiple Launch Rocket Systems
MSL	Mean Sea Level
NATO	North Atlantic Treaty Organisation
NGO	Non-Government Organisation
NVG `	Night Vision Goggles
P1	Petty Officer 1st Class
PCF	Primary Combat Function
RECCE	Reconnaissance
ROE	Rules Of Engagement
SA	Scientific Authority; Situation Awareness
SADL	Situation Awareness Data Link
SERF	Synthetic Environment Research Facility
SME	Subject Matter Expert

SOF	Special Operations Forces
STTO	Start, Taxi and Takeoff
SU	Situation Update
TACAN	Tactical Aircraft Control and Navigation
TACP	Tactical Air Control Party
TIC	Troops In Contact
TO & E	Table of Organization and Equipment
TUAV	Tactical Uninhabited Aerial Vehicle
UAV	Uninhabited Aerial Vehicle
UK	United Kingdom
US	United States
VIP	Very Important Person
VUL	VULnerability
WILCO	WILl COmply
WO	Warrant Officer

1 Introduction

1.1 Background

The Forward Air Controller (FAC) is usually a soldier attached to a land force unit and is trained to call in fixed-wing and rotary air support for the land force units. Currently, within the Canadian Forces (CF), there is no dedicated FAC capability (Board of Inquiry, 2006; Cyr, 2007a; Furber, 2006; and Jarmasz et al., 2007). All of the FACs in the CF have a primary employment, ranging from a Forward Observer Officer Technician (FOO tech) to Petty Officer 1st Class (Pl) / Warrant Officer (WO) to Battery Second In-Command (Bty 2 I/C). When a Task Force deploys on a mission outside of Canada, the Table of Organization and Equipment (TO & E) consequently does not reflect FACs as a separate focused PCF (Primary Combat Function). It is a capability that is always listed as a secondary or complementary duty to that soldier's primary duty, whatever that may be. Regardless of one's trade, FAC qualifications are necessary to be employed as a FAC (NATO Standardization Agency, 2003).

The role of the FAC in Close Air Support (CAS) is critical, as their performance can mean the difference between effective CAS and fratricide (Department of National Defence, 2006; Cyr, 2007a; Jarmasz, 2007). The FAC operates as part of a very distributed team, but effective team performance is necessary for the FAC to be successful. As well as being part of the land force unit, the FAC may work directly with the FAC tech, directly via radio with the pilot (or flight in the case of 2- and 4-ship formations) and the Commander of the ground forces, with the Fire Support Control Centre (FSCC) at headquarters, with Aviation and Air representatives at headquarters, and indirectly with the Commander of the units providing the air assets and his/her Staff. One of the difficulties facing the FAC is the lack of effective training opportunities in Canada. In particular, the differing capabilities and requirements of the pilots they call upon can have unexpected consequences in theatre. To obtain this coalition perspective, FACs often have to train in the United States (US) with US forces (Cyr, 2007b).

Northern Goshawk is a distributed simulation of a joint coalition operation. The Canadian component of the simulation was implemented in the Synthetic Environment Research Facility (SERF) at DRDC Toronto from August 6, 2007 to August 10, 2007. As such, the simulation included land forces being supported by fixed-wing and rotary air assets. The land force was comprised of Canadian soldiers, while the air assets were drawn from the United Kingdom (UK) and US Air Forces. It is hoped that training of this sort will address the shortcomings of existing domestic training provided to Canadian FACs. In order to establish this training benefit, it is necessary to define the task the FAC team performs, and identify suitable metrics for quantifying the team's performance.

Task analysis is a simple and effective method of describing the structure of a task. By combining a hierarchical decomposition of a task into its constituent parts with some description of the logic by which the sub-tasks are performed, and applying a 'stopping rule' to determine when to cease further decomposition, an analyst can generate a task description that can be applied to training design, procedure development, system design, and system measurement. Particularly in the context of this study, a team task analysis can be used to identify tasks that require input by more than one team member, that may vary in a coalition context, and that could serve as suitable measurement points. A task analysis should also include explicit descriptions of overall metrics of

system performance such that the 'critical path' of tasks contributing to the metric can be identified and used to develop measures that can be combined into a measure of team performance.

1.2 Scope and Objective

The scope of this work was limited to the FAC and the pilot. Although other members of the extended team are important, the description and generation of metrics for them was beyond the resources of this contract. The contractor extended and elaborated the task analysis of the FAC during a CAS mission already begun by the Scientific Authority (SA) for this project, and validated the task analysis with Subject Matter Experts (SME). The contractor then constructed a task analysis for the Pilot member of a CAS mission and validated the task analysis with SMEs.

Using the validated task analyses, the contractor identified appropriate measurement points (i.e. when during the FAC's job is it best to measure their performance) that capture elements of team performance. The contractor then leveraged the associated literature to develop Behaviourally Anchored Rating Scales (BARS) that addressed team performance. The work was to be completed by 17th July, 2007; providing time for review and incorporation into the planning for Exercise Northern Goshawk. One hundred BARS that captured team performance were developed and submitted to the SA for review and incorporation into the planning for Exercise Northern Goshawk. The contractor and SA then collaborated to revise the BARS, develop others, and apply them accordingly at the exercise. Finally, the contractor described a brief set of challenges that were encountered during BARS development and use at Exercise Northern Goshawk. Recommendations to address those challenges are provided accordingly.

1.3 Contract and Scientific Authority

This work is under Standing Offer Contract number: W7711-037871 Callup: 7871-17 for DRDC Toronto. The scientific authority for this work is Dr. Jerzy Jarmasz.

1.4 Outline of Report

This report begins by describing the method by which we constructed the task analyses, including the documentation reviewed and the SMEs interviewed, and the manner in which the BARS were developed. The FAC task analysis is then described, followed by a description of the Pilot task analysis. The full task analyses are presented in Annexes A and B respectively. The BARS are then described with instructions for their use. The BARS themselves are presented in Annex C. Next, the application of BARS at Exercise Northern Goshawk is described. Then, a brief set of challenges and recommendations regarding BARS development and use at the exercise is provided. Finally, the data collected at Exercise Northern Goshawk is presented in Annex D.

2 Method

There were five general steps pursued for this project: documentation review; SME interviews; task analysis; validation; and development of BARS. Each one of these steps is described in more detail below.

2.1 Documentation Review

Task Analysis requires a thorough understanding of how a job is performed. Normally the first resource to access is documentation. Documentation can provide the analyst with a good overview and some detail regarding the tasks. Documentation may also provide the analyst with an understanding of task organisation and task flow (although often documentation does a poor job of describing these aspects). Documentation was also reviewed to ensure that the task analysis and the development of BARS were conducted according to industry best practices. The documentation reviewed for this project was as follows:

Barber, A., Brown, D., Chandler, E., Davis, D., Dye, C, Moyer, J., Perez, W., and Wolcott, J. (1991). *Human-Centred Analysis of the Future Close Air Support/Battlefield Air Interdiction (CAS/BAI) Mission* (DTIC Technical Report HSD-TR-1991-0021). Cameron Station, Alexandria, VA: Human Systems Division.

Cyr, D. D. (2007). *Joint Terminal Attack Controller (JTAC) Organisation and Employment in the Canadian Forces*. First Battalion, Princess Patricia's Canadian Light Infantry (1 PPCLI BG), Canadian Forces Base (CFB) Shilo, Manitoba.

Cyr, D. D. (2007). Post Exercise Report : Atlantic Strike V, 14 - 20 Apr 07, Avon Park Air Force Range, Avon Park, Fla. First Royal Canadian Horse Artillery (1 RCHA) Regiment, CFB Shilo, Manitoba.

Furber, J. L. (2006). *A Forward Air Controllers Observation from Afghanistan*. First Royal Canadian Horse Artillery (1 RCHA) Regiment, CFB Shilo, Manitoba.

Jarmasz, J. P. (2007). *FAC SME Interview*. Artillery School, CFB Gagetown, New Brunswick.

Kirwan, B. & Ainsworth, L. K. (Eds.) (1992). *A guide to task analysis*. London, UK: Taylor & Francis.

Matthews, M. L. and Lamoureux, T. M. (2003). *Development of Generic Aircrew Measures of Performance for Distributed Mission Training*. DRDC-TORONTO-CR-2003-060.

NATO Standardization Agency (2003). *STANAG 3797 AO (Edition 2) - Minimum Qualifications for Forward Air Controllers.* B-1110 Brussels, Belgium.

NATO Publication (2005). *Tactics, Techniques and Procedures for Close Air Support Operations* (ATP-3.3.2.1(A)). Brussels, Belgium.

Silverman, D. R., Spiker, V. A., Tourville, S. J., and Nullmeyer, R. T. (1997). *A Combat Mission Team Performance Model: Development and Initial Application* (AL/HR-TP-1997-0001). Brooks Air Force Base (AFB), TX: Air Force Materiel Command, Armstrong Laboratory, Human Resources Directorate.

US Air Force Air Ground Operations School (2001). *Tactical Air Control Party Tactics, Techniques and Procedures*. Nellis Air Force Base (AFB), NV.

US Department of Defence (2005). *Joint Tactics, Techniques and Procedures for Close Air Support* (JP 3-09.3). Washington, DC: Joint Chiefs of Staff.

US Marine Corps Institute (2001). *Forward Air Controller Tactical Pocket Checklist*. Washington Navy Yard DC: Distance Learning & Technologies Department.

Wilson, K. A., Salas, E., Priest, H. A., & Andrews, D. (2007). Errors in the Heat of Battle: Taking a Closer Look at Shared Cognition Breakdowns Through Teamwork. *Human Factors, 49*(2), pp. 243-256.

2.2 SME Interviews

FAC SMEs were accessed through the Commander of the First Royal Canadian Horse Artillery (1 RCHA) regiment. A total of three SMEs were interviewed (Jarmasz, Lamoureux, & Zobarich; 2007) in the course of one day (8th May, 2007). These SMEs included a Sergeant, a Warrant Officer and a Major, the latter two of whom also acted as FAC supervisors for the regiment. The interviews were based on the understanding provided by a preliminary task analysis constructed on the basis of documentation. The interviews tended to focus initially on the overview of the tasks involved in CAS, in chronological order, delving into detail when considered appropriate. Each interview lasted approximately 2 hours.

A pilot SME (with CAS experience flying a CF-18) was accessed through a sub-contract with a specialist consulting firm. As with the FAC SMEs, the pilot SME was interviewed over the course of two hours at DRDC Toronto. The interview was based on the understanding provided by a preliminary task analysis, constructed on the basis of the tasks in the FAC task analysis which involved the pilot in some way. The interview focused initially on the overview of the tasks involved in the CAS, in chronological order, and delved into detail when considered appropriate.

2.3 Task Analysis

Of the various task analysis methods in the literature, it was decided to conduct a Hierarchical Task Analysis (HTA) because of the maturity of the technique, the opportunities for development of metrics it affords, and the ease with which novice analysts can become proficient. Moreover, the SA had a preference for HTA because of a requirement of assessing the CAS team as a "system" and because of HTA's roots in systems engineering.

It was decided to create a 'Team HTA' in which the overall goal of the team ("Conduct CAS Mission") was then broken down by the different members of the broad FAC team. Then each branch (team member) could be developed in detail. In this project, we only developed the FAC branch and the Pilot branch. Since it was a Team HTA, each team member's task breakdown included a number of tasks that fed into, or received input from, or required an explicit appreciation of, the tasks of other team members. Those tasks that fed into or received input from other team members must be explicitly represented in both team members' branches. In practice, we used the tasks in the FAC branch which fed into or received from the Pilot task to form the 'skeleton' of the Pilot's branch. Conceptually, the Team HTA, rather than being a two-dimensional triangle-like representation of a task, becomes a three-dimensional pyramid-like representation of the team's

task, with links through the pyramid from tasks on one 'face' of the pyramid to complementary tasks on another face.

Typically in an HTA, each task is described as a verb-object pair. The subject of the task is always understood (in our work, it would either be the FAC or the Pilot, depending upon which branch is being read). The subject of the task represents the perspective being taken, and we maintained a consistent perspective for each team member's branch.

To make analysis easier, we created a standardised verb taxonomy. The verb taxonomy was derived from the documentation outlined in Section 2.1 (Documentation Review). The manner whereby verbs were selected from the documentation for inclusion in the taxonomy first involved identifying references to the subject (i.e. the FAC or the Pilot) then identifying and recording verbs associated with CAS related tasks. The SA and contractor then complemented the list of verbs with synonyms. These verbs and synonyms were then grouped into classes based on similarity. These classes were then defined and formed the basis of our standardised verb taxonomy. The verb taxonomy was used as a framework for sifting through the material (notes and audio recordings) of the SME Interviews (see Section 2.2 – SME Interviews). Thus, it would be easy to search for certain verbs or to create frequency counts, rather than having to count by hand a variety of different words with the same meaning to come to the same conclusions. The verb taxonomy is as follows:

1. Abort – stop mission
2. Acquire – operate targeting systems to fix on target
3. Analyse – critically consider a 'package' of information
4. Assess – consider something along a single dimension (e.g. risk, success) (includes Determine)
5. Attack – prosecute a target (includes Strike, Neutralize, Engage)
6. Authenticate – verify information, identity, is correct
7. Authorize – give clearance for some action (includes Cleared, Approve)
8. Commence – start some action (only used where the initiation of a task is contingent on some other task or condition being satisfied) (includes Begin)
9. Check-in – initiate contact
10. Clarify – deal with ambiguity in communications
11. Communicate – two way transmit and receive exchanges (includes Discuss)
12. Confirm – indicate that understanding, information is correct (includes Verify, Ensure)
13. Control – provide executive instructions to other parties
14. Cooperate – work with a co-located team member to perform some task
15. Coordinate – using communications to deconflict (combination of two other verbs)
16. Deconflict – separate assets from each other (includes Clear,)
17. Depart – leave area (includes Egress, Leave, see also Evacuate)
18. Deploy – use one's assets (includes Launch, Drop)

19. Detect – become aware of presence of something in your environment
20. Draw – create a graphical representation of something
21. Enter – approach into area (includes Ingress)
22. Evacuate – depart area but with haste due to imminent danger
23. Identify – assign a specific (e.g. unit) name to something in your environment (likely to follow Recognise)
24. Locate – find something in your environment for which you are searching (likely to follow Detect, but Detect may be provided by FAC to pilot, leaving the pilot only to Locate)
25. Maintain – render some factor in a steady state (factor could be communications, risk, contact, visual, etc.)
26. Mark – identify an object, place, thing, person clearly and unambiguously for another team member's benefit
27. Minimise – render some outcome measure (casualties, exposure to danger, communications) as low as possible
28. Move – reposition equipment for operational/performance purposes (contrast with Transit)
29. Operate – manipulate equipment, interact with interface
30. Perform – execute some action, manoeuvre, etc. (includes Execute)
31. Protect – shield another entity from potential harm
32. Read – visually consider text and graphical information
33. Receive – obtain information from other team member (includes Copy, Pass, Provide, Submit, may include Read)
34. Recognise – apply a general categorisation to something in your environment (likely to follow Detect/Locate)
35. Retask – assign a new task to assets (includes Divert)
36. Select – choose one option from a number of potential options (this can include discrete motor/control actions)
37. Synchronise – ensure timings, activities, etc. are in concert with team members'
38. Transit – move (self) from one place to another
39. Transmit – send information to other team mate; may be used in conjunction with noun 'Update', 'Request', 'Report', 'Read-back', 'Description', (includes Copy, Pass, Provide, Submit, may include Read)

Finally, it is possible to decompose a task to the key-stroke level. This would not be the best use of time or effort, and would render the output unusable. Instead, it is necessary to develop a stopping rule. A stopping rule applies some criteria to determine when to cease decomposition. Typically, the stopping rule considers the probability of some error occurring with a task, and the consequence of that error. The following probability times consequence (P×C) considerations were made:

Probability refers to the following statement: Is there likely to be any error in executing that task? Analysts will consider the worst reasonable (i.e. vaguely possible) case. Consideration of error should include both errors of commission and errors of omission.

Definitions of levels of probability:

- Nil: There is no chance of an error happening in the execution of that task.
- Low: That task is simple, performed frequently, and is unlikely to be adversely affected by performance context.
- Moderate: That task is moderately difficult, performed infrequently, and possibly affected by performance context.
- High: That task is very difficult, performed seldom, and is definitely affected by performance context.

Consequence refers to the following statement: If an error occurs in that task, what is the outcome? Again, analysts will consider the worst reasonable case.

Definitions of levels of consequence:

- Nil: No adverse impact of error.
- Low: an error occurs, but does not affect successful completion of the mission.
- Moderate: an error occurs which may affect mission completion, e.g. late, wrong location, minor collateral damage (no loss of infrastructure, no significant injuries), minor damage to airframe.
- High: an error occurs which leads to mission failure, significant collateral damage (e.g. non-combatants killed; schools, religious, and medical buildings destroyed), loss of FAC or aircraft; fratricide.

Probability and consequence are put together in the following manner:

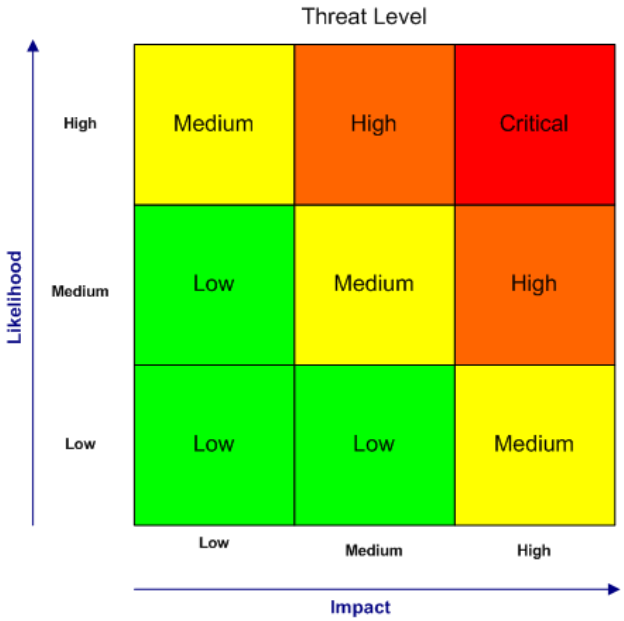

Figure 1: Probability and Consequence

Decomposition should cease once the risk of the task becomes low (i.e. low:low, low:medium, medium:low).

Descriptions of the FAC and Pilot HTAs are provide in sections 3 and 4 respectively.

2.4 Validation

Once each branch of the HTA is constructed, it must be validated with an SME. The validation ensures that the HTA is an accurate representation of the task in terms of the activities performed, the order in which they are performed, and any additional data about tasks that is included in the HTA. If the HTA is not accurate, we run the risk of developing measures that do not adequately capture the learning that is hoped to accrue from distributed simulation.

The SMEs consulted to validate the HTAs were the same SMEs consulted previously (see Section 2.2 – SME Interviews). The FAC HTA was validated by the WO at the First Royal Canadian Horse Artillery (1 RCHA) regiment (Shilo, Manitoba) in the course of one day (25th June, 2007). The Pilot HTA was validated via phone and email correspondence during the course of one week (25th to 29th June, 2007).

SMEs were led through the HTA, beginning with the overview of the whole task (i.e. the first level of decomposition) and then, focusing on each branch in turn, proceeding to the most detailed level of decomposition for each branch. With each successive level of decomposition, the SME was asked if the task descriptions, etc. represented an accurate depiction of the activities they would perform. Any comments or edits suggested by the SME were noted and the HTA was amended to reflect these.

Overall, the draft HTAs did not require extensive revisions as a result of the validation stage. The edits primarily involved fleshing out the tasks to a finer level of detail and organising the flow of the HTA to reflect a more appropriate temporal arrangement of tasks. For example, Pilot HTA task

2.1.4 Review Air Control Order (ACO, see Annex B – Pilot Task Analysis) was elaborated further by the SME such that a more comprehensive list of key information reviewed was included. Also, Pilot HTA task 2.1.4 was placed after task 2.1.1 Meet with Wingman, thus allowing for the Pilot and Wingman to review the ACO together.

The validated HTAs for the FAC and the Pilot are presented in Annexes A and B respectively.

2.5 Development of BARS

The development of BARS proceeded along three fronts. The first was the identification of suitable measurement points in the tasks of the FAC. We focused on those tasks that contributed to the task of another team member, received something from the actions of another team member, or required a significant understanding of the perspective or activities of another team member. We did not choose simple team interactions (e.g. straight information transmissions) unless they made a critical contribution to the overall task (i.e. 'Conduct CAS Mission'). The identification of measurement points indicates **where** measurement should take place; not **what** should be measured. Typically, the measurement point selected was not the lowest level of decomposition. The lowest level of decomposition was often used to inform the scale anchor behavioural descriptions.

The second front was the consideration of the behavioural markers described by Wilson et al (2007). These consisted of three main categories of team activity: Communication, Coordination and Cooperation. Each of these was broken down into further specific items, as listed in Table 1.

Table 1: Behavioural Markers

Communication	Information Exchange Phraseology Closed-Loop Communication
Coordination	Knowledge Requirements Mutual Performance Monitoring Backup Behaviour Adaptability
Cooperation	Team Orientation Collective Efficacy Mutual Trust

We used the specific items listed above to determine **what** to measure at each of the measurement points identified from the HTA. Wilson et al (2007) listed a number of questions associated with each specific item. For instance, questions regarding information exchange include: Did team members seek information from all available resources?; Did team members pass information within a timely manner before being asked?; and Did team members provide 'big picture' situation updates? These questions were used in the development of scale anchor points (tailored to the specific case of the FAC). It became apparent that there were potentially 10 BARS to be applied at each measurement point. In practice, not all BARS were applicable to every measurement point.

The third front was the consideration of the BARS developed by Matthews and Lamoureux (2003). The BARS relate to a conceptual outline of a CF-18 mission and are indexed in Table 2 (below) according to the elements of mission planning, mission execution, and mission debriefing that have been found to best predict mission performance.

Table 2: Index of BARS Developed by Matthews and Lamoureux (2003)

Mission Planning	
Tactics	Task and ROE understanding, route review/analysis
	Factors considered in plan, tactical effectiveness of the plan, development of mission products
	COA and contingency plan, considers performance factors, malfunctions, weather, alternate airfields
	Decision quality
	Use of planning materials: Reference to planning items in mission planning kit
	Development of products: Creation of extra material to help mission understanding
Time management	Time appreciation, efficiency in time spent planning to accomplish all required planning activities
Function allocation and Crew Resource Management (CRM)	
Planning products	Quality of planning products, fuel plan, comm plan, level of detail, quality of plan, use of computer products
Communication	Mission briefings: Detail, participation, comprehensiveness, overall effectiveness
Overall Evaluation	Degree of instructor intervention: Degree of assistance rendered to accomplish planning events
Overall planning Behaviour	
Mission Execution	
Plan compliance	Navigation accuracy: Awareness of current location, adherence to plan considered
	Time control: Stays in synch with planned milestones
Communication systems usage	Stays on correct frequency, talk to proper agency, correct terminology
Aircraft handling and control	Airspeed, altitude, heading
System Awareness	Checklist accomplishment: Checklists accomplished in a timely, accurate manner
	Sensors, status indicators
Resource and crew awareness	
Tactical awareness	Contact detection, spatial awareness, coordination, monitors formation, applies other COA
Mission and goal awareness	Re-establishes mission goals, detects and responds to changes in mission picture
Engagement Skills	Aircraft handling, energy management, gained/maintained offensive advantage

	Weaponry skills: Recognition of weapons employment opportunities, satisfied ROE, validity of shots at trigger squeeze
	Threat reactions: Recognition of exposure to threats, effectiveness of threat reactions, knowledge of threat performance/capabilities
	Role discipline: Ability to fulfil assigned role within the mission, ability to follow the briefed plan, ability to support other crew/formation members during mission
Achievement of primary mission objectives	
Degree of instructor influence	Degree of assistance rendered to accomplish mission events
Overall mission execution behaviour	
Mission Debriefing	
Overall quality and communication	
Mission outcomes	Focus on accomplishment of mission objectives
Crew CRM performance	Focus on CRM performance of the crew
Crewmember technical performance	Focus on technical performance of crewmembers
Lessons learned	Focus on lessons learned during the mission
Instructor intervention	
Overall debriefing behaviour	

Each of the BARS was mapped to the HTA. So, for each task in the HTA, there was a list of potentially applicable generic aircrew BARS. This mapping was generally loose, with very few BARS directly relevant to the FAC. However, those BARS mapped to tasks which were also identified as measurement points served as catalysts for the development of BARS for the FAC. In these cases, the BARS were modified to fit the behavioural markers, and then elaborated with contextual behaviours from the FAC task analysis.

Having identified what should be measured, and where, in the FAC task, measurements should be taken, it was then necessary to develop appropriate scale anchors. We settled upon a 5 point scale as giving sufficient sensitivity to changes in perceived performance while not overwhelming respondents with choice. Using information from the lower level of description in the HTA (if there was one), the questions associated with the behavioural markers, and any applicable information from the generic aircrew BARS, we decided upon what would reflect 'perfect' performance (i.e. a '5' on the scale) and what would reflect very poor performance (i.e. a '1' on the scale). Having agreed these, the two scale ends were reconciled in terms of their content, and complementary anchors for scale points '2', '3' and '4' created. These anchors were not validated by any SMEs.

In total, one hundred BARS that captured team performance were developed and submitted to the SA for review and incorporation into the planning for Exercise Northern Goshawk. The contractor and SA then collaborated to revise the BARS and develop 21others. The revision process included the following:

- Formatting the BARS to be more usable such that they could be read and applied more effectively during the exercise.
- Improving the trust-related BARS with the trust research that Human*systems*® Incorporated has done previously (Adams, Bruyn, & Chung-Yan, 2004; Adams & Sartori, 2006) to include behaviours in the scales which correspond to easily observable behaviours rather than higher order tasks or internal behaviours.
- Developing a set of BARS, i.e. for each of the behavioural markers outlined in Table 1, for FAC task 1.6.2 Transmit Immediate CAS Request.
- For recurring tasks, re-wording the BARS accordingly so as to be applied as often as needed.
- Revising the behavioural gradations for some of the BARS.

The full set of BARS are presented in Annex C – BARS.

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3 FAC Task Analysis

The FAC task analysis consists of eight tasks at the coarsest level of description. These are:

1. Plan CAS Mission
2. Build and Maintain Situation Awareness (SA)
3. Maintain Personal Safety
4. Perform Planned ISR Mission (not decomposed any further)
5. Perform Planned CAS Mission
6. Perform Immediate/Troops In Contact (TIC) CAS Mission
7. Deconflict Target Area and Airspace
8. Abort CAS Mission

We attempted to render 'self-contained' all of the tasks at this level. That is to say, the tasks should represent a unique grouping of activity that is not repeated identically elsewhere in the task analysis. Often this results in a task analysis that reads like a chronology of tasks. This is not the case with the FAC task analysis, as four of the eight tasks would be performed chronologically under other tasks.

Situation awareness is built and maintained throughout a FAC's deployment, not just during the time outside the wire. Also everything sensed during a mission helps to build and maintain SA, especially given the asymmetric nature of insurgent activities in Afghanistan. SA serves as an enabler to good decision making and high performance (Jarmasz, 2007; Jarmasz, Lamoureux, & Zobarich (2007).. Because SA feeds all other tasks, it was described as its own task. However, the user of the task analysis needs to remember that all other tasks draw from SA, and feed SA.

Maintenance of personal safety is also done throughout a soldier's time outside of the wire. To describe maintenance of personal safety as a specific task under another task would reduce its importance. The maintenance of personal safety is a task carried out at all times, and is complementary to all other FAC tasks. Hence, personal safety was described as its own task.

The deconfliction of the target area and the airspace is also a task that is carried out throughout the FAC's mission. As such, it does not occur at a particular point in another task; it may occur repeatedly and at any time. For this reason, deconfliction was described as its own task. Similarly, the abort task may occur at any point during a CAS mission, although it is not likely to occur repeatedly. For this reason, abort CAS mission was described as its own task.

The FAC task analysis reflects the feedback received from an SME at 1 RCHA (Jarmasz, Lamoureux, & Zobarich (2007). The full FAC task analysis is presented at Annex A.

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4 Pilot Task Analysis

The Pilot task analysis consists of nine tasks at the coarsest level of description. These are:

1. Plan CAS Mission
2. Build and Maintain SA
3. Start, Taxi and Takeoff (STTO)
4. Maintain Personal Safety
5. Transit to Destination (CP/IP)
6. Perform Planned CAS Mission
7. Receive Immediate CAS Request
8. Abort CAS Mission
9. Return to Base

Of these tasks, six reflect those of the FAC (Plan mission, build/maintain SA, maintain personal safety, perform planned or immediate CAS mission, and abort). The Pilot's task analysis includes the various transit phases because the pilot may receive mission-related information during these phases. Hence it was important to describe the phases in order to understand the complete cast of operators associated with the broader team.

The Pilot task analysis reflects the feedback received from the CF-18 SME. The full Pilot task analysis is presented at Annex B.

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5 BARS

Based on the team behavioural markers developed by Wilson et al (2007), 10 questions were developed. These are listed below according to the general area they describe (i.e. communication, coordination, cooperation). Also included are the number of times each question was developed as a BARS for specific measurement points identified in the HTA. A total of 121 questions were developed.

Communication

1. How effective was information exchange (17)?
2. Was communication economical (15)?
3. Did close-loop communication go as expected (13)?

Coordination

4. How well did the team members monitor each other's performance (16)?
5. How well were team members' knowledge requirements managed (11)?
6. How effective was back-up behaviour (7)?
7. How adaptable were team members to the changing demands of the situation (14)?

Cooperation

8. To what extent were team members working toward the same ends (11)?
9. How effective were the FAC/others as a team (10)?
10. To what extent did team members display mutual trust (7)?

Each one of these questions was considered as a potential BARS for each measurement point identified in the HTA. A total of 17 measurement points were considered when developing BARS. The following table (Table 3) presents the measurement points and the BARS selected for development.

Table 3: BARS Selection Table

Measurement Point	Comm			Coordination				Coop		
	1	2	3	4	5	6	7	8	9	10
Determine air assets	✓	✓		✓				✓	✓	
Understand blue situation	✓	✓	✓	✓	✓		✓	✓	✓	
Understand red situation	✓	✓	✓	✓	✓		✓	✓	✓	
Understand white situation	✓	✓	✓	✓	✓		✓	✓	✓	
Understand brown situation	✓	✓	✓	✓	✓		✓	✓	✓	
Understand time	✓	✓	✓	✓	✓	✓	✓			
Maintain personal safety	✓				✓	✓				✓
Transmit immediate CAS request	✓	✓	✓	✓	✓	✓	✓	✓		✓
Receive pilot's scheduled check-in	✓	✓	✓	✓	✓		✓			
Deconflict target area and airspace	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transmit CAS brief	✓	✓	✓	✓		✓	✓	✓	✓	

Measurement Point	Comm			Coordination				Coop		
	1	2	3	4	5	6	7	8	9	10
Communicate remarks	✓	✓	✓	✓		✓	✓	✓	✓	
Communicate options with pilot	✓	✓	✓	✓			✓			
Designate target	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coordinate with FOO	✓	✓	✓	✓			✓	✓	✓	✓
Transmit talk-on	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Perform BDA	✓			✓						
Abort CAS mission	✓	✓		✓	✓					✓

Across all measurement points, a total of 45 questions are asked about communication, 48 questions about coordination, and 28 about cooperation. This reflects the fact that 1) the CAS job is more about coordinating different tasks than collectively carrying out tasks, and, 2) the FAC has few opportunities to cooperate with other members of the team to achieve the goal. This lack of cooperation opportunities would change if the FAC worked with a FAC tech.

The BARS are presented in full, according to the measurement point and the behavioural marker, in Annex C -BARS.

6 Application of BARS

This section describes the application of BARS (see Annex C - BARS) at Exercise Northern Goshawk. The exercise was a distributed simulation of a joint coalition operation. The Canadian component of the simulation was implemented in the Synthetic Environment Research Facility (SERF) at DRDC Toronto from August 6, 2007 to August 10, 2007. As such, the simulation included land forces being supported by fixed-wing and rotary air assets. The land force was comprised of Canadian soldiers, while the air assets were drawn from the United Kingdom (UK) and US Air Forces.

Prior to the exercise, the SA grouped BARS according to their relevance to different stages of anticipated CAS missions. This organisation is presented in Annex D – BARS Applied at Exercise Northern Goshawk. On each day of the exercise, following the FAC check-in with ASOC, two raters (i.e. the contractor and the SA) applied the BARS. Ratings were collected by the raters for the duration of the missions scheduled for each day (approximately 2 hrs/day). These ratings are also presented in Annex D – BARS Applied at Exercise Northern Goshawk..

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7 Challenges and Recommendations

Table 4 describes a brief set of challenges that were encountered during BARS development and use at Exercise Northern Goshawk. Recommendations to address these challenges are provided accordingly.

Table 4: Challenges and Recommendations

Challenges	Recommendations
Development of BARS	
To determine the number and nature of BARS to develop to assess team training. For instance, how many BARS should be developed, what precise behaviours should be measured and from which perspective(s): the FAC's 1-on-1 actions with a team member, only the wider CAS team, or some combination of both?	The number and nature of BARS developed to assess team training depends on the purpose and scope of the assessment. The purpose of the assessment outlines *why* the assessment is taking place. Understanding why the assessment is taking place helps to ensure that questions of scientific merit are pointed in a clear, well-guided direction. The theoretical underpinnings of the assessment should be explored and culminate in the framing of general and/or specific hypotheses about team training which can be tested rigorously. Hypotheses should relate to particular measurement points of the task analysis (i.e. where to measure), and be stated in terms of observable behaviours (e.g. the anticipated BARS ratings for FAC task 1.7 'Deconflict target area and airspace'). Once the BARS are applied, collected data should be analysed in a manner which tests the hypotheses and thus the very reason for conducting the assessment in the first place. To help guide the development of BARS it would be beneficial for the contractor and SA to operationalise hypotheses in the manner described above.
To develop BARS that are highly tailored to specific tasks. Some BARS were difficult for raters to apply given a lack of domain specific knowledge and a failure in the BARS themselves to capture the required level of behavioural information in the anchors, e.g. see C.2.2 Understand Situation, Coordination, 'How adaptable were team members to the changing demands of the situation?'	The wording of these BARS must accommodate for particular behaviours. Develop BARS according to the method outlined in section 2.5, perform an SME validation of the BARS (this was not done for this contract), then refine the BARS based on SME feedback, establish inter-rater reliability, apply the BARS at an exercise, and refine them again.
To develop trust-related BARS with observable behavioural markers that could be rated reliably amongst different raters.	Leverage previous work done by Human*systems*® Incorporated (e.g., Adams et al., 2004; Adams & Sartori, 2006) to further refine the trust-related BARS, establish inter-rater reliability, apply the BARS, supplement data collection with self-reports (e.g., questionnaires), and validate BARS by means of comparing them with the self-report data.

Challenges	Recommendations
	Reliable BARS should yield the same results on repeated measures. Ensure that each rater is adequately trained to administer the BARS and establish inter-rater reliability via the communications recordings of the exercise. Have two or more raters review the same event from the exercise and independently apply the same BARS. Compute a correlation coefficient to demonstrate the strength of the relationship between one rater's rating and the other's. The strength of the correlation, i.e. the disagreement (viz. agreement) should be used as an indicator to refine/not the BARS, respectively.
To develop BARS that capture factors of distributed teamwork (from physically distinct locations) at the same or different times (synchronous vs. asynchronous) which can lead to ineffective team performance.	Conduct a literature review to identify such factors, integrate those factors with the method to develop BARS outlined in section 2.5 of this report. Then apply, refine and validate the BARS.
Application of BARS at Exercise Northern Goshawk	
To apply the BARS effectively in real-time. Often, many of the 121 BARS were applicable at any given time (e.g. tasks occurred in parallel). As each CAS mission progressed, the potential for multiple ratings escalated and application of the BARS became demanding for the raters. In this demanding situation, raters searched for the most relevant and useful BARS. Also, notes were taken and served to reconstruct sequences of events. However, this proved to be too difficult to do effectively. Unfortunately, only a selection of the BARS could realistically be applied by each of the two raters at any given time. As a result, some BARS which should have been applied were not applied, some ratings were forgotten now and then, and some useful data may not have been captured.	Fortunately, recordings of communications from the exercise are available for administration of BARS post hoc. Each CAS mission could be mined for useful data to further refine the BARS themselves and assess team training. The contractor recommends that the measurement points, as defined by the task analysis, be traced against the audio recordings of the exercise with particular questions or hypotheses in mind. Then decisions will need to be made regarding which measurement points to assess and which BARS to apply, e.g. generic or highly tailored. The contractor also recommends that an SME apply highly tailored BARS and provide feedback to further refine and develop those BARS.
	Prior to the exercise, the SA grouped BARS according to their relevance to different stages of the anticipated CAS missions. This organisation reflected the organization of both task analyses and is presented in Annex C. This organization also facilitated the collection of BARS in real-time and is recommended for future exercises and/or experiments.
	Assign BARS to raters such that each rater is responsible for FAC tasks not occurring in parallel. FAC tasks which occurred in parallel during the exercise include: deconflict target area and airspace, transmit talk on, and build/maintain SA (Blue, Red, White, Brown).
To collect and organise multiple ratings of the same BARS in real-time.	The contractor recommends that a post exercise analysis of audio recordings of the CAS mission be conducted to explore multiple BARS ratings across time. Measurement points, as defined by the task analysis, should be traced against the audio recordings of the exercise with particular questions or hypotheses in mind. The mapping would naturally organise multiple ratings across time.

Challenges	Recommendations
To apply 121 potential BARS in an exploratory manner in real-time.	Apply BARS first by breadth then by depth. That is, cast the proverbial (exploratory) net wide at first via the application of a generic/reusable set of BARS. When something of interest is observed, e.g. the current situation relates to the golden hypothesis re. team training, identify the task, the measurement point(s), then apply corresponding and highly tailored BARS, and have an SME apply them and/or provide narrative details to describe the current situation. SME feedback could also be used to validate and refine the BARS themselves.
To capture aspects of distributed teamwork (from physically distinct locations) at same or different times (synchronous vs. asynchronous) which may lead to ineffective team performance.	Determine which aspects of distributed teamwork to focus on and conduct a post exercise analysis of the communications (audio/video) recordings of the CAS missions. This would also support the development and application of appropriate BARS.

As can be seen in Table 4, there were many challenges associated with both the development and application of BARS.

Overall, challenges associated with developing the BARS can be addressed by operationalising hypotheses prior to development, developing and validating BARS in a systematic way that optimizes validity and inter-rater reliability and training raters. It is also recommended that, in the future, BARS are developed that address the physical distribution (i.e. distributed vs. co-located) of and the synchrony of communications (i.e. synchronous vs. asynchronous) between team members.

The manner in which raters applied the BARS at Exercise Northern Goshawk (i.e. to collect single ratings and multiple ratings of the same BARS) varied considerably (see Annex D – BARS Applied at Exercise Northern Goshawk). This variance stems from the challenges identified in Table 4 to develop and apply the BARS. Overall, challenges associated with the application of BARS, in general, can be addressed by grouping BARS according to different stages of the anticipated CAS mission, identifying measurement points which occur in parallel and assigning associated BARS to different raters, and administering the BARS post hoc via audio/video recordings of the exercise.

Many of the recommendations provided in Table 4 are dependent on the availability of audio/video recordings of the exercise. Therefore, collecting audio/video data of future exercises and/or experiments is highly recommended.

The challenges faced to develop and apply the BARS obscure the identification of any 'obvious' qualitative patterns (e.g. coordination ratings improving over the course of Exercise Northern Goshawk or better coordination with US aircraft). Results would be murky at best, would require a significant amount of additional work, and is beyond the scope of this contract. The challenges to determine those qualitative patterns can be overcome by refining the BARS as per the recommendations described in Table 4, with particular emphasis on establishing an appropriate level of inter-rater reliability.

Reliable BARS should yield the same results on repeated measures. The variance in raters' results could be reduced by adopting the recommendations described in Table 4 to establish an appropriate level of inter-rater reliability. Inter-rater reliability analysis assigns a score that reflects how much

consensus there is between raters for each BARS that is applied. The raters' level of consensus (or lack thereof) is then used as an indicator of the need to refine specific BARS. If the level of consensus is low for a particular BARS, it may be that the BARS is defective or the raters need to be re-trained on how to appropriately apply the BARS. Defective BARS may still be valid (i.e. measure what it is intended to measure) but may not be at the level of precision or calibrated appropriately for the researcher to investigate the significance of the variables of interest (e.g. variables which impact the training effects of distributed coalition mission training).

7.1 Next steps

The contractor highly recommends that an appropriate level of inter-rater reliability for all relevant BARS be established prior to their application in future exercises. First, it is recommended that each rater is adequately trained to administer the BARS. Second, an inter-rater reliability analysis should be conducted using communications recordings from Exercise Northern Goshawk or other exercises. To do this, two or more raters must review the same event(s) from the exercise(s) and independently apply the same BARS. From these ratings, statistical analyses such as a correlation can be computed to evaluate the strength of the relationship between different raters' ratings. This information can be used as an indicator of BARS that need to be further refined.

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Annex A – FAC Task Analysis

#	Task	Plan
0	Conduct CAS mission	
1	FAC	Do 1 when required, do 2 - 3 always, do 4 - 6 as required, do 7 for every mission, do 8 as required
1.1	Plan CAS mission	Do 1 - 3 as required in FSCC; do 4 - 5 in order when on patrol
1.1.1	Receive commander's intent/orders/mission	Do 1 - 2 as required
1.1.1.1	Understand commander's intent/orders/mission	
1.1.1.2	Communicate commander's intent/orders/mission	
1.1.2	Determine air assets	Do 1 - 4 in any order
1.1.2.1	Determine ordinance required	
1.1.2.2	Determine aircraft types required	
1.1.2.3	Determine required number of air assets to achieve desired effects	
1.1.2.4	Determine playtime	
1.1.3	Communicate requirements with G3 plans (should get CAS info into ATO)	
1.1.4	Receive CAS line-up for the day (radio)	Do 1 - 3 in order
1.1.4.1	Receive call signs	
1.1.4.2	Receive type of aircraft	
1.1.4.3	Receive arrival times	
1.1.5	Determine how to use air assets	Do 1 - 3 in order
1.1.5.1	Identify needs of current situation	
1.1.5.2	Prioritise needs of current situation	
1.1.5.3	Select highest priority need that matches aircraft capability	
1.1.6	Select type of control to apply	Do 1 - 3 as required
1.1.6.1	Select type I control	
1.1.6.2	Select type II control	
1.1.6.3	Select type III control	
1.2	Build and maintain Situation Awareness (SA)	Do 1 - 5 as appropriate. Do 6 at the beginning of the mission and with each corresponding change.
1.2.1	Understand Blue situation	Do 1 - 2 as required

#	Task	Plan
1.2.1.1	Understand ground picture	Do 1 - 4 in any order
1.2.1.1.1	Understand footprint of CF forces	Do 1 - 3 in any order
1.2.1.1.1.1	Understand personnel	
1.2.1.1.1.2	Understand vehicles	
1.2.1.1.1.3	Understand artillery	
1.2.1.1.2	Understand footprint of coalition forces	
1.2.1.1.3	Understand footprint of ANA forces	
1.2.1.1.4	Understand SOF	
1.2.1.2	Understand air picture	Do 1 - 3 in any order
1.2.1.2.1	Understand rotary wing assets	Do 1 - 2 in any order as required
1.2.1.2.1.1	Understand MEDEVAC	
1.2.1.2.1.2	Understand attack helicopters	
1.2.1.2.2	Understand fixed wing assets	Do 1 - 6 in any order as required
1.2.1.2.2.1	Understand Harriers	
1.2.1.2.2.2	Understand F-16s	
1.2.1.2.2.3	Understand F-18s	
1.2.1.2.2.4	Understand A-10s	
1.2.1.2.2.5	Understand Tornadoes	
1.2.1.2.2.6	Understand B-1s	
1.2.1.2.3	Understand UAV assets	Do 1 - 2 in any order as required
1.2.1.2.3.1	Understand predators	
1.2.1.2.3.2	Understand TUAV	
1.2.2	Understand Red situation - insurgents	Do 1 - 6 in any order
1.2.2.1	Understand location	
1.2.2.2	Understand weaponry	
1.2.2.3	Understand CONOP	
1.2.2.4	Understand size of force	
1.2.2.5	Understand organisation of force	
1.2.2.6	Understand cover	
1.2.3	Understand White situation	Do 1 - 4 in any order
1.2.3.1	Understand civilians	
1.2.3.2	Understand other non-combatants, e.g. NGOs and VIPs	
1.2.3.3	Understand ANP	

#	Task	Plan
1.2.3.4	Understand significant local landmarks, e.g. hospitals, schools, mosques, graveyards	
1.2.4	Understand Brown situation - weather, terrain, location	Do 1 - 7 in any order
1.2.4.1	Understand weather	
1.2.4.2	Understand terrain	
1.2.4.3	Understand opportunities for cover	
1.2.4.4	Understand opportunities for observation	
1.2.4.5	Understand opportunities for movement	
1.2.4.6	Understand visibility	
1.2.4.7	Understand opportunities for concealment	
1.2.5	Understand time	Do 1 - 4 in any order
1.2.5.1	Determine current time	
1.2.5.2	Determine time elapsed since significant point in time	
1.2.5.3	Determine time before significant point in time	
1.2.5.4	Determine time available to perform some activity	
1.2.6	Select correct frequency on radio	Do 1 - 4 in order
1.2.6.1	Read frequency tables from ATO	
1.2.6.2	Select appropriate frequency(ies)	
1.2.6.3	Turn on radio	
1.2.6.4	Operate radio to select appropriate frequency(ies)	
1.3	Maintain personal safety	Do 1 - 8 in any order as required
1.3.1	Assess risk to self	
1.3.2	Assess requirement to leave cover of LAV	
1.3.3	Compare risk of injury with time outside of cover	
1.3.4	Compare risk of injury with degree of exposure outside of cover	
1.3.5	Assess benefit of exposing self to risk	
1.3.6	Assess need to remove protective equipment	
1.3.7	Communicate location to other friendly forces	
1.3.8	Select Observation Point	Do 1 - 3 in any order
1.3.8.1	Select location with good visibility of target	
1.3.8.2	Select location with good security	
1.3.8.3	Select location with good communications	

#	Task	Plan
1.4	Perform planned ISR mission	
1.5	Perform planned CAS mission	Do 1 - 2 in order, then 3 - 6 and 9 - 12 in order if there is a target, or 7 - 8 in order if there is no target, then do 13 - 14 in order
1.5.1	Operate equipment to obtain targeting coordinates	Do 1, then 2 - 4 in any order
1.5.1.1	Select DAGR or LRF	Do 1 - 2 in order
1.5.1.1.1	Assess degree of precision required	
1.5.1.1.2	Select DAGR or LRF	
1.5.1.2	Operate equipment to obtain elevation	
1.5.1.3	Operate equipment to obtain grid reference	
1.5.1.4	Operate equipment to calculate distances to significant points (for talk on)	
1.5.2	Receive pilot's scheduled check-in	Do 1 - 12 in order
1.5.2.1	Receive callsign	
1.5.2.2	Receive mission number	
1.5.2.3	Receive as fragged	
1.5.2.4	Receive number and type of aircraft	
1.5.2.5	Receive position and altitude	
1.5.2.6	Receive ordinance	
1.5.2.7	Receive playtime	
1.5.2.8	Receive abort code	
1.5.2.9	Transmit copy check-in	
1.5.2.10	Transmit copy abort code	
1.5.2.11	Transmit request abort code	
1.5.2.12	Transmit situation update	Do 1 - 5 as required
1.5.2.12.1	Transmit general enemy situation	
1.5.2.12.2	Transmit threat activity	
1.5.2.12.3	Transmit friendly situation	
1.5.2.12.4	Transmit artillery activity	
1.5.2.12.5	Transmit hazards	Do 1 - 3 as required
1.5.2.12.5.1	Transmit weather effects	
1.5.2.12.5.2	Transmit terrain hazards	
1.5.2.12.5.3	Transmit obstructions	

#	Task	Plan
1.5.3	Deconflict target area and airspace - go to 1.7	
1.5.4	Transmit 9 line	Do 1 - 9 in order
1.5.4.1	Transmit Initial Point (IP) / Battle Position (BP)	
1.5.4.2	Transmit heading (IP/BP to target) and offset (left/right)	
1.5.4.3	Transmit distance (IP-to-target in nautical miles / BP-to-target in meters)	
1.5.4.4	Transmit target elevation (in feet MSL)	
1.5.4.5	Transmit target description	
1.5.4.6	Transmit target location	
1.5.4.7	Transmit type mark and actual code	
1.5.4.8	Transmit location of friendlies	
1.5.4.9	Transmit egress route	
1.5.5	Receive readback	
1.5.6	Transmit corrections	Do 1 - 2 as required
1.5.6.1	Transmit corrections for readback errors	
1.5.6.2	Transmit corrections for errors/inacurracies in original 9 line	
1.5.7	Communicate remarks	Do 1 - 5 as required
1.5.7.1	Communicate weapons effects	
1.5.7.2	Communicate attack geometry	
1.5.7.3	Communicate number of attempts	
1.5.7.4	Communicate level of risk for blue and white forces	
1.5.7.5	Transmit clearance to leave CP/IP for target area	
1.5.8	Communicate options with pilot	Do 1 - 5 as required
1.5.8.1	Communicate needs with pilot	
1.5.8.2	Communicate level of risk to blue and white forces	
1.5.8.3	Communicate how aircraft can address needs	
1.5.8.4	Select best use of air assets	
1.5.8.5	Authorize use of air asset	
1.5.9	Maintain communications with pilot	Do 1 - 5 as required
1.5.9.1	Receive information from pilot	
1.5.9.2	Transmit further queries to pilot	
1.5.9.3	Communicate with pilot regarding courses of action	

#	Task	Plan
1.5.9.4	Select appropriate course of action	
1.5.9.5	Authorise pilot to pursue selected course of action	
1.5.10	Designate target	Do 1 - 5 as required
1.5.10.1	Mark using laser	Do 1, then 2 - 3 as required, then 4
1.5.10.1.1	Operate LTM-91/GLTD II *	
1.5.10.1.2	Coordinate with FOO	
1.5.10.1.3	Coordinate with predator operator *	
1.5.10.1.4	Maintain laser contact on target	
1.5.10.2	Mark using infrared	Do 1 - 4 in order
1.5.10.2.1	Operate AN/PEQ-4A	
1.5.10.2.2	Confirm to pilot that target is marked	
1.5.10.2.3	Receive pilot acknowledgement that IR designators line up	
1.5.10.2.4	Confirm to pilot that IR designators line up	
1.5.10.3	Mark using smoke	Do 1 - 3 in order
1.5.10.3.1	Coordinate with FOO	
1.5.10.3.2	Confirm visually smoke is correct	
1.5.10.3.3	Confirm that pilot sees smoke	
1.5.10.4	Mark using illumination	Do 1 - 3 in order
1.5.10.4.1	Coordinate with FOO	
1.5.10.4.2	Confirm visually target is illuminated	
1.5.10.4.3	Confirm that pilot sees illumination	
1.5.10.5	Mark using fires	Do 1 - 3 as required, then do 4 - 5 in order
1.5.10.5.1	Coordinate with FOO	
1.5.10.5.2	Coordinate with LAV gunner	
1.5.10.5.3	Coordinate with A-10	
1.5.10.5.4	Confirm visually target is being identified	
1.5.10.5.5	Confirm that pilot sees fire	
1.5.11	Transmit talk-on	Do 1 - 17 in order
1.5.11.1	Plan inbound route for aircraft	
1.5.11.2	Select reference points / objects for communication to pilot	
1.5.11.3	Transmit reference point to target	

#	Task	Plan
1.5.11.4	Receive pilot contact reference point	
1.5.11.5	Transmit unit of measure	
1.5.11.6	Receive pilot contact of unit of measure	
1.5.11.7	Transmit direction	
1.5.11.8	Transmit distance	
1.5.11.9	Transmit object	
1.5.11.10	Receive pilot contact object	
1.5.11.11	Confirm (visually) pilot is routing as expected	
1.5.11.12	Transmit target ID	Do 1 - 5 in order
1.5.11.12.1	Transmit location of target with respect to reference mark	
1.5.11.12.2	Transmit target description	
1.5.11.12.3	Receive pilot contact target	
1.5.11.12.4	Confirm target	Do 1 or 2 as required
1.5.11.12.4.1	Confirm target is identified (visually) from own location	
1.5.11.12.4.2	Confirm target is identified from target pod feed	
1.5.11.12.5	Receive pilot tally target	
1.5.11.13	Confirm target	Do 1 - 5 in order
1.5.11.13.1	Transmit request for target area description	
1.5.11.13.2	Receive target area description from pilot	
1.5.11.13.3	Transmit further questions about target area	
1.5.11.13.4	Receive answers to questions	
1.5.11.13.5	Transmit concurrence to pilot	Do 1 - 3 as required
1.5.11.13.5.1	Confirm target is identified (visually) from own location	
1.5.11.13.5.2	Confirm target is identified from pilot's description	
1.5.11.13.5.3	Confirm target is identified from target pod feed	
1.5.11.14	Transmit talk-on onto friendly position	
1.5.11.15	Receive pilot's visual on friendlies	
1.5.11.16	Transmit attack heading	
1.5.11.17	Receive pilot's WILCO	
1.5.12	Transmit attack clearance	Do 1 - 5 in order
1.5.12.1	Transmit attack clearance and conditions	
1.5.12.2	Receive pilot's WILCO	
1.5.12.3	Receive pilot's in hot plus heading	

#	Task	Plan
1.5.12.4	Confirm (visually) pilot's heading	
1.5.12.5	Transmit cleared hot	
1.5.13	Perform BDA	Do 1 - 6 in order
1.5.13.1	Receive pilot's off hot	
1.5.13.2	Analyse target area	
1.5.13.3	Assess effect on target	
1.5.13.4	Transmit BDA to aircraft	
1.5.13.5	Receive pilot's copy	
1.5.13.6	Direct aircraft to re-attack	
1.5.14	Authorize aircraft egress	
1.5.15	Receive pilot's confirmation	
1.6	Perform Troops in Contact (TIC) CAS mission	Do 1 - 14 in order
1.6.1	Assess that CAS is required	Do 1, or do 2 - 3 in order
1.6.1.1	Assess that CAS is required on own initiative	
1.6.1.2	Transmit decision to Coy Comd	
1.6.2	Transmit Immediate CAS Request	Do 1 or 2
1.6.2.1	Transmit CAS Request to ASOC	Do 1 - 3 in any order, then 4
1.6.2.1.1	Transmit request for specific aircraft type	
1.6.2.1.2	Transmit request for specific ordinance/effect type	
1.6.2.1.3	Transmit priority of request	
1.6.2.1.4	Receive confirmation of request	
1.6.2.2	Transmit CAS Request to FSCC	Do 1 - 2 in any order, then 3
1.6.2.2.1	Transmit situation update	
1.6.2.2.2	Transmit Immediate CAS Request	
1.6.2.2.3	Receive confirmation of request	
1.6.3	Operate equipment to obtain targeting coordinates	Do 1, then 2 - 4 in any order
1.6.3.1	Select DAGR or LRF	Do 1 - 2 in order
1.6.3.1.1	Assess degree of precision required	
1.6.3.1.2	Select DAGR or LRF	
1.6.3.2	Operate equipment to obtain elevation	
1.6.3.3	Operate equipment to obtain grid reference	
1.6.3.4	Operate equipment to calculate distances to significant points (for talk on)	

#	Task	Plan
1.6.3.5	Transmit CAS Request to ASOC	Do 1 - 3 in any order, then 4
1.6.3.5.1	Transmit request for specific aircraft type	
1.6.3.5.2	Transmit request for specific ordinance/effect type	
1.6.3.5.3	Transmit priority of request	
1.6.3.5.4	Receive confirmation of request	
1.6.4	Receive pilot's check-in	Do 1 - 12 in order
1.6.4.1	Receive callsign	
1.6.4.2	Receive mission number	
1.6.4.3	Receive as fragged	
1.6.4.4	Receive number and type of aircraft	
1.6.4.5	Receive position and altitude	
1.6.4.6	Receive ordinance	
1.6.4.7	Receive playtime	
1.6.4.8	Receive abort code	
1.6.4.9	Transmit copy check-in	
1.6.4.10	Transmit copy abort code	
1.6.4.11	Transmit request abort code	
1.6.4.12	Transmit situation update	Do 1 - 5 as required
1.6.4.12.1	Transmit general enemy situation	
1.6.4.12.2	Transmit threat activity	
1.6.4.12.3	Transmit friendly situation	
1.6.4.12.4	Transmit artillery activity	
1.6.4.12.5	Transmit hazards	Do 1 - 3 as required
1.6.4.12.5.1	Transmit weather effects	
1.6.4.12.5.2	Transmit terrain hazards	
1.6.4.12.5.3	Transmit obstructions	
1.6.5	Deconflict target area and airspace - go to 1.7	
1.6.6	Transmit 9 line	Do 1 - 9 in order
1.6.6.1	Transmit Initial Point (IP) / Battle Position (BP)	
1.6.6.2	Transmit heading (IP/BP to target) and offset (left/right)	
1.6.6.3	Transmit distance (IP-to-target in nautical miles / BP-to-target in meters)	
1.6.6.4	Transmit target elevation (in feet MSL)	

#	Task	Plan
1.6.6.5	Transmit target description *	
1.6.6.6	Transmit target location	
1.6.6.7	Transmit type mark and actual code	
1.6.6.8	Transmit location of friendlies	
1.6.6.9	Transmit egress route	
1.6.7	Receive readback	
1.6.8	Transmit corrections	Do 1 - 2 as required
1.6.8.1	Transmit corrections for readback errors	
1.6.8.2	Transmit corrections for errors/inacurracies in original 9 line	
1.6.9	Communicate remarks	Do 1 - 5 as required
1.6.9.1	Communicate weapons effects	
1.6.9.2	Communicate attack geometry	
1.6.9.3	Communicate number of attempts	
1.6.9.4	Communicate level of risk for blue and white forces	
1.6.9.5	Transmit clearance to leave CP/IP for target area	
1.6.10	Designate target	Do 1 - 5 as required
1.6.10.1	Mark using laser	Do 1, then 2 - 3 as required, then 4
1.6.10.1.1	Operate LTM-91/GLTD II *	
1.6.10.1.2	Coordinate with FOO	
1.6.10.1.3	Coordinate with predator operator *	
1.6.10.1.4	Maintain laser contact on target	
1.6.10.2	Mark using infrared	Do 1 - 4 in order
1.6.10.2.1	Operate AN/PEQ-4A	
1.6.10.2.2	Confirm to pilot that target is marked	
1.6.10.2.3	Receive pilot acknowledgement that IR designators line up	
1.6.10.2.4	Confirm to pilot that IR designators line up	
1.6.10.3	Mark using smoke	Do 1 - 3 in order
1.6.10.3.1	Coordinate with FOO	
1.6.10.3.2	Confirm visually smoke is correct	
1.6.10.3.3	Confirm that pilot sees smoke	
1.6.10.4	Mark using illumination	Do 1 - 3 in order

#	Task	Plan
1.6.10.4.1	Coordinate with FOO	
1.6.10.4.2	Confirm visually target is illuminated	
1.6.10.4.3	Confirm that pilot sees illumination	
1.6.10.5	Mark using fires	Do 1 - 3 as required, then do 4 - 5 in order
1.6.10.5.1	Coordinate with FOO	
1.6.10.5.2	Coordinate with LAV gunner	
1.6.10.5.3	Coordinate with A-10	
1.6.10.5.4	Confirm visually target is being identified	
1.6.10.5.5	Confirm that pilot sees fire	
1.6.11	Transmit talk-on	Do 1 - 17 in order
1.6.11.1	Plan inbound route for aircraft	
1.6.11.2	Select reference points / objects for communication to pilot	
1.6.11.3	Transmit reference point to target	
1.6.11.4	Receive pilot contact reference point	
1.6.11.5	Transmit unit of measure	
1.6.11.6	Receive pilot contact unit of measure	
1.6.11.7	Transmit direction	
1.6.11.8	Transmit distance	
1.6.11.9	Transmit object	
1.6.11.10	Receive pilot contact object	
1.6.11.11	Confirm (visually) pilot is routing as expected	
1.6.11.12	Transmit target ID	Do 1 - 5 in order
1.6.11.12.1	Transmit location of target with respect to reference mark	
1.6.11.12.2	Transmit target description	
1.6.11.12.3	Receive pilot contact target	
1.6.11.12.4	Confirm target	Do 1 or 2 as required
1.6.11.12.4.1	Confirm target is identified (visually) from own location	
1.6.11.12.4.2	Confirm target is identified from target pod feed	
1.6.11.12.5	Receive pilot tally target	
1.6.11.13	Confirm target	Do 1 - 5 in order
1.6.11.13.1	Transmit request for target area description	
1.6.11.13.2	Receive target area description from pilot	

#	Task	Plan
1.6.11.13.3	Transmit further questions about target area	
1.6.11.13.4	Receive answers to questions	
1.6.11.13.5	Transmit concurrence to pilot	Do 1 - 3 as required
1.6.11.13.5.1	Confirm target is identified (visually) from own location	
1.6.11.13.5.2	Confirm target is identified from pilot's description	
1.6.11.13.5.3	Confirm target is identified from target pod feed	
1.6.11.14	Transmit talk-on onto friendly position	
1.6.11.15	Receive pilot's visual on friendlies	
1.6.11.16	Transmit attack heading	
1.6.11.17	Receive pilot's WILCO	
1.6.12	Transmit attack clearance	Do 1 - 5 in order
1.6.12.1	Transmit attack clearance and conditions	
1.6.12.2	Receive pilot's WILCO	
1.6.12.3	Receive pilot's in hot plus heading	
1.6.12.4	Confirm (visually) pilot's heading	
1.6.12.5	Transmit cleared hot	
1.6.13	Perform BDA	Do 1 - 6 in order
1.6.13.1	Receive pilot's off hot	
1.6.13.2	Analyse target area	
1.6.13.3	Assess effect on target	
1.6.13.4	Transmit BDA to aircraft	
1.6.13.5	Receive pilot's copy	
1.6.13.6	Direct aircraft to re-attack	
1.6.14	Authorize aircraft egress	
1.7	Deconflict target area	Do 1 - 10 in any order
1.7.1	Communicate with Coy commander	Do 1 - 3 in order
1.7.1.1	Transmit request for locations of blue forces	
1.7.1.2	Receive locations of blue forces	
1.7.1.3	Transmit information regarding type of air support to be expected	
1.7.2	Coordinate with FOO	Do 1 - 4 in any order, then 5, then 6 - 7 as required
1.7.2.1	Transmit request for firing location	

#	Task	Plan
1.7.2.2	Transmit request for firing rate	
1.7.2.3	Transmit request for remaining duration of firing	
1.7.2.4	Transmit request for max ord	
1.7.2.5	Receive information about artillery	
1.7.2.6	Transmit request for cessation of firing (at time t)	
1.7.2.7	Transmit request to set max ord	
1.7.3	Draw locations on map	Do 1 - 3 in any order as required
1.7.3.1	Draw locations of friendly units	
1.7.3.2	Draw known locations of enemy units	
1.7.3.3	Drawn known hazards to aviation (wires, terrain, etc.)	
1.7.4	Calculate safe distances	
1.7.5	Calculate artillery radials	
1.7.6	Calculate airspace blocks (max ord)	
1.7.7	Select holding points	
1.7.8	Calculate attack headings (avoid overflying friendly units)	
1.7.9	Calculate attack profile	
1.7.10	Calculate egress headings	
1.8	Abort CAS mission	Do 1, then 3 - 5 in order; do 2 as required
1.8.1	Detect conditions that require abort	Do 1 - 8 in any order as required
1.8.1.1	Assess that attack heading is incorrect	
1.8.1.2	Assess that attack heading is not being followed	
1.8.1.3	Assess that pilot has not visually acquired target	
1.8.1.4	Detect that friendly forces have entered drop zone	
1.8.1.5	Detect that non-combatants have entered drop zone	
1.8.1.6	Detect significant risk to aircraft	
1.8.1.7	Assess that pilot has not followed reference points	
1.8.1.8	Receive instruction from Coy Comd or higher	
1.8.2	Assess whether target can be reacquired	Do 1 - 3 in any order
1.8.2.1	Assess whether enough time remains	
1.8.2.2	Assess whether it is safe to do so	
1.8.2.3	Assess whether abort conditions will change	
1.8.3	Transmit abort	

#	Task	Plan
1.8.4	Receive abort	
1.8.5	Detect aircraft breaking off attack	
2	Pilot	
3	Fire Support Coordination Centre (FSCC)	
4	Air Support Operation Centre (ASOC)	
5	Forward Observation Officer (FOO)	
6	Back-up (x2)	
7	FOO Tech	
8	Signals	
9	Company Commander	

Annex B – Pilot Task Analysis

#	Task	Plan
0	Conduct CAS Mission	
1	FAC	
2	Pilot	Do 1 when required, do 2 and 4 always, do 3, 5-9 as required.
2.1	Plan CAS mission	Do 1-5 in order, then do 10-15 in order when mission needs to be built; Do 1, then do 6-15 in order, do 8 and 9 time permitting when mission has been built by someone else.
2.1.1	Meet with wingman	
2.1.2	Receive orders	Do 1 and 2 in any order as required.
2.1.2.1	Receive Air Tasking Order (ATO)	
2.1.2.2	Receive Airspace Control Order (ACO)	
2.1.3	Review ATO	Do 1-17 in any order.
2.1.3.1	Review general instructions	
2.1.3.2	Review specific mission	
2.1.3.3	Review number of aircraft tasked	
2.1.3.4	Review mission number	
2.1.3.5	Review the requested weapons load out	
2.1.3.6	Review laser codes	
2.1.3.7	Review call sign	
2.1.3.8	Review Air-to-Air Refuelling (AAR) information	Do 1-4 in order as required.
2.1.3.8.1	Review location for AAR	
2.1.3.8.2	Review coordination time for AAR	
2.1.3.8.3	Determine whether scheduled take off time/ mission time will accommodate AAR	
2.1.3.8.4	Ensure that fragged fuel off load is adequate	
2.1.3.9	Review necessary radio frequencies and associated agencies	
2.1.3.10	Review CAS schedule	
2.1.3.11	Review when CAS was requested (VUL time)	
2.1.3.12	Ensure VUL time it is adequate and appropriate	
2.1.3.13	Review associated routing information	

#	Task	Plan
2.1.3.14	Review Mode 1,2,3c information	
2.1.3.15	Review 4 Identify Friend Foe (IFF) information	
2.1.3.16	Review 'Have Quick' (HQ) information	
2.1.3.17	Review air to air Tactical Aircraft Control and Navigation (TACAN) Channel	
2.1.4	Review ACO	Do 1-11 in any order.
2.1.4.1	Review Commander's (JFACC) guidance	
2.1.4.2	Review Command and Control communications structure (who to talk to, when and where)	
2.1.4.3	Review the Rules of Engagement (ROE)	
2.1.4.4	Review departure and arrival procedures for area of operation	
2.1.4.5	Review AAR track structure	
2.1.4.6	Review authenticators and Code words	
2.1.4.7	Review safe passage routes, altitudes and times	
2.1.4.8	Review Combat Search and Rescue (CSAR) information	
2.1.4.9	Review Bullseye	
2.1.4.10	Review Contact Points (CP), Initial Points (IP) and Killboxes	
2.1.4.11	Review Airspace restrictions (dimensions and active times)	
2.1.5	Build mission	Do 1-8 in order as required.
2.1.5.1	Review area of operations	Do 1-4 in any order as required.
2.1.5.1.1	Review maps	
2.1.5.1.2	Review routes	
2.1.5.1.3	Review targets	
2.1.5.1.4	Review controlling agencies	
2.1.5.2	Perform short pre-planning brief to assign tasks and convey plan	
2.1.5.3	Assess the weather and its affects on the mission	
2.1.5.4	Build Mission Data Card (MDC)	Do 1-7 in any order as required.
2.1.5.4.1	Input relevant ATO data	
2.1.5.4.2	Input relevant ACO data	
2.1.5.4.3	Input routing information	
2.1.5.4.4	Input fuel information	

#	Task	Plan
2.1.5.4.5	Input AAR information	
2.1.5.4.6	Input weapons data	
2.1.5.4.7	Input Self Defense suite programming information	
2.1.5.5	Build Weapons delivery attack card	Do 1-4 in order as required.
2.1.5.5.1	Input weapons type	
2.1.5.5.2	Input fusing and arming data	
2.1.5.5.3	Input relevant safety data	
2.1.5.5.4	Develop and input attack	Do 1-6 in any order as required.
2.1.5.5.4.1	Determine most effective delivery type	
2.1.5.5.4.2	Determine possible target types	
2.1.5.5.4.3	Assess terrain	
2.1.5.5.4.4	Assess the weather	
2.1.5.5.4.5	Assess the enemy defenses	
2.1.5.5.4.6	Assess self defense and egress options	
2.1.5.6	Build Map (electronically)	Do 1-7 in any order as required.
2.1.5.6.1	Input routing	
2.1.5.6.2	Input threats	
2.1.5.6.3	Input friendly forces	
2.1.5.6.4	Input enemy forces	
2.1.5.6.5	Input civilian locations	
2.1.5.6.6	Input all relevant ACO routing/restrictions/safe passage data	
2.1.5.6.7	Input AAR tracks	
2.1.5.7	Print and make copies of all mission material including the map	
2.1.5.8	Program Aircraft interface card (PCMCIA card)	
2.1.6	Receive mission pack	
2.1.7	Review mission pack	
2.1.8	Build briefing for wingman (time permitting)	
2.1.9	Brief wingman (time permitting)	
2.1.10	Meet with Ground Liaison Officer (GLO)	Do 1 as required.
2.1.10.1	Receive Situation Update (assume SU Alpha)	Do 1-4 in any order as required.
2.1.10.1.1	Plot all pertinent information on paper map	

#	Task	Plan
2.1.10.1.2	Review friendly ground situation	
2.1.10.1.3	Record SU Alpha time	
2.1.10.1.4	Discuss any unclear points of interest	
2.1.11	Meet with Intelligence Officer	Do 1 as required.
2.1.11.1	Receive Intelligence briefing	Do 1-5 in any order as required.
2.1.11.1.1	Receive enemy activities and capabilities	
2.1.11.1.2	Receive civilian locations and current situation	
2.1.11.1.3	Plot all pertinent information on paper map	
2.1.11.1.4	Review Enemy ground/sea/air situation	
2.1.11.1.5	Discuss any unclear points of interest	
2.1.12	Take care of physiological needs	Do 1 and 2 in any order as required.
2.1.12.1	Consume food	
2.1.12.2	Use facilities	
2.1.13	Sign out equipment	Do 1 for night CAS and do 2 in any order.
2.1.13.1	Sign out Night Vision Goggles (NVG) - night time only	Do 1 and 2 in any order.
2.1.13.1.1	Test NVGs	
2.1.13.1.2	Focus NVGs	
2.1.13.2	Sign out personal sidearm	Do 1
2.1.13.2.1	Inspect personal sidearm	
2.1.14	Go to the Ops desk	
2.1.15	Receive out-brief at the Ops desk	Do 1-4 in any order as required.
2.1.15.1	Receive weather conditions/effects	
2.1.15.2	Perform administrative duties	
2.1.15.3	Request last minute situation updates	
2.1.15.4	Receive last minute situation updates (if applicable, Alpha would update to Bravo, etc.)	
2.2	Build and maintain SA	Do 1-5 in any order as appropriate.
2.2.1	Understand Blue situation	Do 1-5 in any order as required.
2.2.1.1	Understand air picture	
2.2.1.2	Understand ground picture	Do 1
2.2.1.2.1	Understand footprint of CF forces	Do 1-3 in any order as required.
2.2.1.2.1.1	Understand personnel	

#	Task	Plan
2.2.1.2.1.2	Understand vehicles	
2.2.1.2.1.3	Understand artillery	
2.2.1.3	Understand footprint of coalition forces	
2.2.1.4	Understand footprint of Afghan National Army (ANA) forces	
2.2.1.5	Understand Special Operations Forces (SOF)	
2.2.2	Understand Red situation - insurgents	Do 1-6 in any order as required.
2.2.2.1	Understand location	
2.2.2.2	Understand weaponry	
2.2.2.3	Understand Concept of Operations (CONOP)	
2.2.2.4	Understand size of force	
2.2.2.5	Understand organisation of force	
2.2.2.6	Understand cover	
2.2.3	Understand White situation	Do 1-4 in any order as required.
2.2.3.1	Understand civilians	
2.2.3.2	Understand other non-combatants, e.g. Non-Governmental Organisations (NGO)s and Very Important Persons (VIP)s	
2.2.3.3	Understand Afghan National Police (ANP)	
2.2.3.4	Understand significant local landmarks, e.g. hospitals, schools, mosques, graveyards	
2.2.4	Understand Brown situation	Do 1-4 in any order as required.
2.2.4.1	Understand weather	
2.2.4.2	Understand terrain	
2.2.4.3	Understand visibility	
2.2.5	Understand time	Do 1-4 in any order.
2.2.5.1	Determine time elapsed since significant point in time	
2.2.5.2	Determine time before significant point in time	
2.2.5.3	Determine time available to perform some activity	
2.2.5.4	Determine playtime	
2.3	Start, Taxi and Takeoff (STTO)	Do 1-23 in order as required.
2.3.1	Perform walk around inspection of aircraft	
2.3.2	Identify any technical problems/concerns	
2.3.3	Discuss any technical problems/concerns with ground	

#	Task	Plan
	crew	
2.3.4	Board aircraft and get strapped in	
2.3.5	At scheduled start time indicate to ground crew that the start sequence will commence	
2.3.6	Receive authorization from ground crew to commence start	
2.3.7	Start Aircraft	
2.3.8	Perform systems checks	Do 1-14 in any order as required.
2.3.8.1	Perform engine check	
2.3.8.2	Perform flight control check	
2.3.8.3	Perform avionics check	
2.3.8.4	Perform weapons systems check	
2.3.8.5	Perform radar check	
2.3.8.6	Perform self defense suite check	
2.3.8.7	Perform pressurization and oxygen check	
2.3.8.8	Perform ejection seat check	
2.3.8.9	Perform hydraulics check	
2.3.8.10	Perform pneumatics check	
2.3.8.11	Perform electrical check	
2.3.8.12	Perform fuel check	
2.3.8.13	Perform AAR system check	
2.3.8.14	Perform arresting hook and lighting checks	
2.3.9	Load avionics data into aircraft via PCMCIA interface card	
2.3.10	Verify that all information loaded correctly	
2.3.11	Review routing and timing information	
2.3.12	Check in with other A/C in flight (wingman)	
2.3.13	Ensure that communication links are secure and jam resistant	Do 1 and 2 in any order.
2.3.13.1	Perform test of Have Quick (HQ) radio	
2.3.13.2	Perform test of KY 58 transmission security device	
2.3.14	Request final words from Ops desk	
2.3.15	Receive final words from Ops desk	
2.3.16	Receive permission from Ops desk to taxi/depart for mission	

#	Task	Plan
2.3.17	Taxi	
2.3.18	Perform weapons arming procedure with ground crew (at button of runway)	
2.3.19	Test Radar Warning Receiver with ground crew (at button of runway)	
2.3.20	Takeoff	
2.3.21	Rejoin into briefed formation	
2.3.22	Fly departure routing	
2.3.23	Perform airborne weapons verification check	
2.4	Maintain personal safety	Do 1-12 in any order as required.
2.4.1	Assess safe passage information from AWACS (if available)	
2.4.2	Consider radar warnings	
2.4.3	Assess risk to self	
2.4.4	Assess benefit of exposing self to risk	
2.4.5	Determine locations o friendly forces	
2.4.6	Communicate locations of friendly forces	
2.4.7	Identify enemy air defences	
2.4.8	Fly high	
2.4.9	Adjust altitude according to the nature of the enemy threat	
2.4.10	Plot information regarding enemy order of battle which is relevant to the projected mission on a paper map	Do 1-7 in any order as appropriate.
2.4.10.1	Plot artillery positions	
2.4.10.2	Plot any Multiple Launch Rocket Systems (MLRS)	
2.4.10.3	Plot naval support	
2.4.10.4	Plot Forward Line of Own Troops (FLOT)	
2.4.10.5	Plot IPs and CPs	
2.4.10.6	Plot Forward Edge of Battlefield Activity (FEBA)	
2.4.10.7	Plot all divisions associated with the battlefield	
2.4.11	Correlate plotted information with system output	
2.4.12	Verify location of friendlies	
2.5	Transit to destination (CP/IP)	Do 1-6 in order as required.
2.5.1	Communicate with Airborne Warning and Control System (AWACS) aircraft	Do 1-9 in order as required.

#	Task	Plan
2.5.1.1	Transmit initial call to AWACS aircraft	
2.5.1.2	Receive request for authentication	
2.5.1.3	Transmit authentication	
2.5.1.4	Transmit check-in	Do 1-4 in order, do 5 as required.
2.5.1.4.1	Transmit call sign	
2.5.1.4.2	Transmit mission number	
2.5.1.4.3	Transmit number and type of aircraft	
2.5.1.4.4	Transmit course of action for CAS	
2.5.1.4.5	Perform tests of HQ and KY 58	
2.5.1.5	Transmit confirm up to date SU	
2.5.1.6	Receive new SU	
2.5.1.7	Record new SU	
2.5.1.8	Plot new SU information on paper map	
2.5.1.9	Get pushed to ASOC	
2.5.2	Enter Area of Operations (AO)	
2.5.3	Perform Fence check	Do 1-6 in order as required.
2.5.3.1	Set up radar	
2.5.3.2	Set up aircraft self defense suite	Do 1-6 in order.
2.5.3.2.1	Arm chaff	
2.5.3.2.2	Ensure chaff is functional by dispensing one chaff	
2.5.3.2.3	Arm flare	
2.5.3.2.4	Ensure flare is functional by dispensing one flare	
2.5.3.2.5	Turn up volume on radar warning receiver	
2.5.3.2.6	Turn on jammers	
2.5.3.3	Activate aircraft self defense suite	
2.5.3.4	Turn on the Master Arm switch to ensure that weapons release is possible	
2.5.3.5	Test G-suit	
2.5.3.6	Set up IFF suite	
2.5.4	Re-fuel (air-to-air) as required	
2.5.5	Communicate with Air Support Operations Center (ASOC)	Do 1 and 2 together, then do 3 and 4 in order when 9 line is available; Do 1 and 2 together, then do 3, 4-9 in order, do 10 when FAC is part of the TACP or do 11 when FAC is operating

#	Task	Plan
		alone and is not part of the TACP.
2.5.5.1	Check-in with ASOC	
2.5.5.2	Perform tests of HQ and KY 58	
2.5.5.3	Transmit request for 9 line	
2.5.5.4	Go to task 2.6.4 Receive 9 line (if available)	
2.5.5.5	Transmit confirm up to date SU	
2.5.5.6	Receive changes to SU	
2.5.5.7	Record changes to SU	
2.5.5.8	Plot changes to SU information on paper map	
2.5.5.9	Transit to CP/IP	
2.5.5.10	Get pushed to TACP	
2.5.5.11	Get pushed to FAC	Do 1
2.5.5.11.1	Go to task 2.6.1 transmit scheduled check-n to FAC	
2.5.6	Communicate with Tactical Air Control Party (TACP)	Do 1 and 2 together, then do 3-14 in order as required.
2.5.6.1	Check-in with TACP commander (usually the Air Liaison Officer)	
2.5.6.2	Perform tests of HQ and KY 58 (if equipped)	
2.5.6.3	Transmit confirm up to date SU	
2.5.6.4	Receive changes to SU	
2.5.6.5	Record changes to SU	
2.5.6.6	Plot changes to SU information on paper map	
2.5.6.7	Look outside aircraft to correlate with map	
2.5.6.8	Operate targeting pods to gather additional information	
2.5.6.9	Plot additional information on map	
2.5.6.10	Correlate additional information with system output	
2.5.6.11	Decide whether danger close	
2.5.6.12	Transmit request for company commander's initial if danger close	
2.5.6.13	Receive company commander's initials	
2.5.6.14	Get pushed to FAC	
2.6	Perform planned CAS mission	Do 1-19 in order as required.
2.6.1	Transmit scheduled check-in to FAC	Do 1-17 in order as required.
2.6.1.1	Transmit callsign	

#	Task	Plan
2.6.1.2	Transmit mission number	
2.6.1.3	Transmit as fragged	
2.6.1.4	Transmit number and type of aircraft	
2.6.1.5	Transmit position and altitude	
2.6.1.6	Transmit ordinance	
2.6.1.7	Transmit playtime	
2.6.1.8	Transmit abort code	
2.6.1.9	Receive copy check-in	
2.6.1.10	Receive copy abort code	
2.6.1.11	Receive request abort code	
2.6.1.12	Determine who has weapons release authority	
2.6.1.13	Determine type of control (1, 2, or 3)	
2.6.1.14	Transmit confirm up to date SU	
2.6.1.15	Receive changes to SU	Do 1-5 in order as required.
2.6.1.15.1	Receive general enemy situation	
2.6.1.15.2	Receive threat activity	
2.6.1.15.3	Receive friendly situation	
2.6.1.15.4	Receive artillery activity	
2.6.1.15.5	Receive hazards	Do 1-3 in any order as required.
2.6.1.15.5.1	Receive weather effects	
2.6.1.15.5.2	Receive terrain hazards	
2.6.1.15.5.3	Receive obstructions	
2.6.1.16	Record changes to SU	
2.6.1.17	Plot new SU information on paper map	
2.6.2	Perform tests of HQ and KY 58 (if equipped)	
2.6.3	Orbit as directed	Do 1-6 as directed.
2.6.3.1	Orbit at the IP	
2.6.3.2	Orbit within visual range of target but not overhead, (Offset Racetrack)	
2.6.3.3	Orbit overhead target (Wheel)	
2.6.3.4	Orbit Keyhole	
2.6.3.5	Orbit in a Keypad	
2.6.3.6	Receive AAR as required/scheduled	

#	Task	Plan
2.6.4	Receive 9 Line	Do 1-9 in order as required.
2.6.4.1	Receive Initial Point (IP) / Battle Position (BP)	
2.6.4.2	Receive heading (IP/BP to target and offset (left/right)	
2.6.4.3	Receive distance)IP-to-target in nautical miles / BP-to-target in meters)	
2.6.4.4	Receive target elevation (in feet MSL)	
2.6.4.5	Receive target description	
2.6.4.6	Receive target location	
2.6.4.7	Receive type mark and actual code	
2.6.4.8	Receive location of friendlies	
2.6.4.9	Receive egress route	
2.6.5	Transmit mandatory read back items	Do 1 or 2 as required.
2.6.5.1	Transmit mandatory NATO read back items	Do 1-4 in order.
2.6.5.1.1	Transmit IP	
2.6.5.1.2	Target location	
2.6.5.1.3	Mandatory attack heading	
2.6.5.1.4	Friendly Forces	
2.6.5.2	Transmit mandatory JFIRE read back items	Do 1-4 in order.
2.6.5.2.1	IP/BP	
2.6.5.2.2	Target location	
2.6.5.2.3	Friendly Forces	
2.6.6	Receive corrections for read back errors	Do 1 and 2 in any order as required.
2.6.6.1	Receive corrections for read back errors	
2.6.6.2	Receive corrections for errors/inaccuracies in original 9 line	
2.6.7	Communicate remarks	Do 1-5 in any order as required.
2.6.7.1	Communicate weapons effects	
2.6.7.2	Communicate attack geometry	
2.6.7.3	Communicate number of attempts	
2.6.7.4	Communicate level of risk for blue and white forces	
2.6.7.5	Receive clearance to leave CP/IP for target area	
2.6.8	Communicate options with FAC	Do 1-5 as required.
2.6.8.1	Communicate needs with FAC	

#	Task	Plan
2.6.8.2	Communicate level of risk to blue and white forces	Do 1-2 in order.
2.6.8.2.1	Correlate blue, white and red locations	
2.6.8.2.2	Determine whether blue and white forces are danger close	
2.6.8.3	Transmit request for initials	Do 1 and 2 in order as required.
2.6.8.3.1	Transmit request for company commander's initials	
2.6.8.3.2	Transmit request for higher initials	
2.6.8.4	Communicate how aircraft can address needs	
2.6.8.5	Receive authorisations	Do 1 and 2 as required.
2.6.8.5.1	Receive authorisation for weapons release	
2.6.8.5.2	Receive authorisation for recce pass	
2.6.9	Receive target mark(s)	Do 1-4 in any order as required.
2.6.9.1	Receive target mark(s) via infrared	Do 1-3 in order.
2.6.9.1.1	Receive FAC confirmation that target is marked	
2.6.9.1.2	Transmit acknowledgement to FAC that IR designators line up	
2.6.9.1.3	Receive FAC confirmation that IR designators line up	
2.6.9.2	Receive target mark(s) via smoke	Do 1-3 in order.
2.6.9.2.1	Receive FAC query to confirm visual on smoke	
2.6.9.2.2	Transmit confirmation that smoke is seen	
2.6.9.2.3	Receive talk on from the smoke to the target	
2.6.9.3	Receive target mark(s) via fires	Do 1-4 in order.
2.6.9.3.1	Coordinate with FAC	
2.6.9.3.2	Receive FAC query to confirm visual on fire	
2.6.9.3.3	Transmit confirmation that fire is seen	
2.6.9.3.4	Receive talk on from fire to the target	
2.6.9.4	Receive target mark(s) electronically	Do 1-5 in order.
2.6.9.4.1	Operate the Situation Awareness Data Link (SADL/LINK-16/ECS)	
2.6.9.4.2	Coordinate with CF-18s via the ECS radio system	
2.6.9.4.3	Transmit request for target mark(s)	
2.6.9.4.4	Receive target marks	
2.6.9.4.5	Transmit confirmation that electronic marks have been received and seen	
2.6.10	Receive talk on onto friendly position	

#	Task	Plan
2.6.11	Transmit visual on friendlies	
2.6.12	Receive talk on	Do 1 when orbitting; Do 2-16 in order as required.
2.6.12.1	Receive Map talk-on while orbiting (depends on tactical situation)	
2.6.12.2	Receive FAC query to confirm visual on target illumination	
2.6.12.3	Transmit confirmation that target illumination is seen	
2.6.12.4	Receive FAC reference point to target	
2.6.12.5	Transmit contact reference point	
2.6.12.6	Receive direction	
2.6.12.7	Receive distance	
2.6.12.8	Receive object	
2.6.12.9	Transmit contact object	
2.6.12.10	Transmit request for cover (to wingman)	
2.6.12.11	Move to have a closer look (if required, e.g. no visual on target)	
2.6.12.12	Receive target ID	Do 1-4 in order.
2.6.12.12.1	Receive location of target with respect to reference mark	
2.6.12.12.2	Receive target description	
2.6.12.12.3	Transmit contact target	
2.6.12.12.4	Transmit tally target	
2.6.12.13	Confirm request	Do 1-5 in order.
2.6.12.13.1	Receive FAC request for target area description	
2.6.12.13.2	Transmit target area description	
2.6.12.13.3	Receive FAC further questions about target area	
2.6.12.13.4	Transmit answers to questions	
2.6.12.13.5	Receive FAC concurrence	
2.6.12.14	Transmit confirm attack heading	
2.6.12.15	Receive confirmed attack heading	
2.6.12.16	Transmit ROGER WILCO	
2.6.13	Receive attack clearance	Do 1 and 2 in order, then do either 3 and 4 or do 5.
2.6.13.1	Receive attack clearance and conditions	
2.6.13.2	Transmit ROGER WILCO	

#	Task	Plan
2.6.13.3	Transmit in hot plus heading	
2.6.13.4	Receive cleared hot	
2.6.13.5	Transmit off hot	
2.6.14	Release weapons	
2.6.15	Transmit request for BDA and orders	
2.6.16	Perform BDA	Do 1-11 in order as required.
2.6.16.1	Record who dropped the weapons	
2.6.16.2	Record time weapons went off (impact)	
2.6.16.3	Record weapon type	
2.6.16.4	Record the number of weapons released	
2.6.16.5	Record position of target that was under attack	
2.6.16.6	Assess weapons effects on target	Do 1-6 in any order as required.
2.6.16.6.1	Use unaided eyes to gather information	
2.6.16.6.2	Operate onboard sensors to gather information	
2.6.16.6.3	Determine whether target was hit	
2.6.16.6.4	Determine whether target was missed	
2.6.16.6.5	Determine whether target was destroyed	
2.6.16.6.6	Determine whether target was immobilised	
2.6.16.7	Record weapons effects on target	
2.6.16.8	Record any other related or useful information	
2.6.16.9	Transmit request for RECCE pass (if needed)	
2.6.16.10	Transmit BDA update to FAC	
2.6.16.11	Confirm BDA with FAC	
2.6.17	Transmit request for BDA and orders	Do 1-9 in any order as required.
2.6.17.1	Receive BDA	Do 1-4 in any order.
2.6.17.1.1	Receive BDA from FAC	
2.6.17.1.2	Receive BDA from FAC(A)	
2.6.17.1.3	Receive BDA from RECCE	
2.6.17.1.4	Receive BDA from AWACS	
2.6.17.2	Transmit request to confirm that BDA is correct	
2.6.17.3	Receive confirmation that information is correct	
2.6.17.4	Receive corrections	
2.6.17.5	Determine remaining playtime	Do 1 and 2 in any order.

#	Task	Plan
2.6.17.5.1	Determine remaining fuel	
2.6.17.5.2	Determine remaining ordnance	
2.6.17.6	Receive FAC authorisation to return to orbiting position	Do 1-6 as directed.
2.6.17.6.1	Return to IP	
2.6.17.6.2	Return to within visual range of target but not overhead, (Offset Racetrack)	
2.6.17.6.3	Return to overhead target (Wheel)	
2.6.17.6.4	Return to Keyhole	
2.6.17.6.5	Return to Keypad	
2.6.17.6.6	Transit to receive AAR as required/scheduled	
2.6.17.7	Receive FAC authorisation to re-attack	
2.6.17.8	Receive FAC authorisation to egress	
2.6.17.9	Receive FAC authorisation to proceed to next target	
2.6.18	Receive FAC authorisation to egress	
2.6.19	Transmit confirmation	
2.7	Receive immediate CAS request	Do 1-24 as required.
2.7.1	Receive request for specific ordinance/effect type	
2.7.2	Receive priority of request	
2.7.3	Determine whether correct ordnance is available for effect type	
2.7.4	Communicate options	
2.7.5	Transmit confirmation of request	
2.7.6	Transmit decline request	
2.7.7	Program route/destination	Do 1 and 2 in any order.
2.7.7.1	Enter destination	
2.7.7.2	Enter waypoints	
2.7.8	Transit to IP/CP	Do 1
2.7.8.1	Orbit as directed	Do 1-6 as directed.
2.7.8.1.1	Orbit at the IP	
2.7.8.1.2	Orbit within visual range of target but not overhead, (Offset Racetrack)	
2.7.8.1.3	Orbit overhead target (Wheel)	
2.7.8.1.4	Orbit Keyhole	
2.7.8.1.5	Orbit in a Keypad	

#	Task	Plan
2.7.8.1.6	Receive AAR as required/scheduled	
2.7.9	Transmit check-in to FAC	Do 1-17 in order as required.
2.7.9.1	Transmit callsign	
2.7.9.2	Transmit mission number	
2.7.9.3	Transmit as fragged	
2.7.9.4	Transmit number and type of aircraft	
2.7.9.5	Transmit position and altitude	
2.7.9.6	Transmit ordinance	
2.7.9.7	Transmit playtime	
2.7.9.8	Transmit abort code	
2.7.9.9	Receive copy check-in	
2.7.9.10	Receive copy abort code	
2.7.9.11	Receive request abort code	
2.7.9.12	Determine who has weapons release authority	
2.7.9.13	Determine type of control (1, 2, or 3)	
2.7.9.14	Transmit confirm up to date SU	
2.7.9.15	Receive changes to SU	Do 1-5 in any order as required.
2.7.9.15.1	Receive general enemy situation	
2.7.9.15.2	Receive threat activity	
2.7.9.15.3	Receive friendly situation	
2.7.9.15.4	Receive artillery activity	
2.7.9.15.5	Receive hazards	Do 1-3 in any order as required.
2.7.9.15.5.1	Receive weather effects	
2.7.9.15.5.2	Receive terrain hazards	
2.7.9.15.5.3	Receive obstructions	
2.7.9.16	Record changes to SU	
2.7.9.17	Plot new SU information on paper map	
2.7.10	Perform tests of HQ and KY 58 (if equipped)	
2.7.11	Receive 9 Line	Do 1-9 in order as required.
2.7.11.1	Receive Initial Point (IP) / Battle Position (BP)	
2.7.11.2	Receive heading (IP/BP to target and offset (left/right)	
2.7.11.3	Receive distance)IP-to-target in nautical miles / BP-to-target in meters)	

#	Task	Plan
2.7.11.4	Receive target elevation (in feet MSL)	
2.7.11.5	Receive target description	
2.7.11.6	Receive target location	
2.7.11.7	Receive type mark and actual code	
2.7.11.8	Receive location of friendlies	
2.7.11.9	Receive egress route	
2.7.12	Transmit mandatory read back items	Do 1 or 2 as required.
2.7.12.1	Transmit mandatory NATO read back items	Do 1-4 in order.
2.7.12.1.1	Transmit IP	
2.7.12.1.2	Target location	
2.7.12.1.3	Mandatory attack heading	
2.7.12.1.4	Friendly Forces	
2.7.12.2	Transmit mandatory JFIRE read back items	Do 1-3 in order.
2.7.12.2.1	IP/BP	
2.7.12.2.2	Target location	
2.7.12.2.3	Friendly Forces	
2.7.13	Receive corrections for read back errors	Do 1 and 2 in any order as required.
2.7.13.1	Receive corrections for readback errors	
2.7.13.2	Receive corrections for errors/inaccuracies in original 9 line	
2.7.14	Communicate remarks	Do 1-5 in any order as required.
2.7.14.1	Communicate weapons effects	
2.7.14.2	Communicate attack geometry	
2.7.14.3	Communicate number of attempts	
2.7.14.4	Communicate level of risk for blue and white forces	
2.7.14.5	Receive clearance to leave CP/IP for target area	
2.7.15	Receive target mark(s)	Do 1-3 in any order as required.
2.7.15.1	Receive target mark(s) via infrared	Do 1-3 in order.
2.7.15.1.1	Receive FAC query to confirm visual on smoke	
2.7.15.1.2	Transmit confirmation that smoke is seen	
2.7.15.1.3	Receive Talk on from the smoke to the target	
2.7.15.2	Receive target mark(s) via fires	Do 1-4 in order.
2.7.15.2.1	Coordinate with FAC	

#	Task	Plan
2.7.15.2.2	Receive FAC query to confirm visual on fire	
2.7.15.2.3	Transmit confirmation that fire is seen	
2.7.15.2.4	Receive talk on from fires to the target	
2.7.15.3	Receive target mark(s) electronically	Do 1-5 in order.
2.7.15.3.1	Operate the Situation Awareness Data Link (SADL/LINK-16/ECS)	
2.7.15.3.2	Coordinate with CF-18s via the ECS radio system	
2.7.15.3.3	Transmit request for target mark(s)	
2.7.15.3.4	Receive target marks	
2.7.15.3.5	Transmit confirmation that electronic marks have been received and seen	
2.7.16	Receive talk on onto friendly position	
2.7.17	Transmit visual on friendlies	
2.7.18	Receive talk on	Do 1 when orbitting; Do 2-16 in order as required.
2.7.18.1	Receive Map talk-on while orbiting (depends on tactical situation)	
2.7.18.2	Receive FAC query to confirm visual on target illumination	
2.7.18.3	Transmit confirmation that target illumination is seen	
2.7.18.4	Receive FAC reference point to target	
2.7.18.5	Transmit contact reference point	
2.7.18.6	Receive direction	
2.7.18.7	Receive distance	
2.7.18.8	Receive object	
2.7.18.9	Transmit contact object	
2.7.18.10	Transmit request for cover (to wingman)	
2.7.18.11	Move to have a closer look (if required, e.g. no visual on target)	
2.7.18.12	Receive target ID	Do 1-4 in any order as required.
2.7.18.12.1	Receive location of target with respect to reference mark	
2.7.18.12.2	Receive target description	
2.7.18.12.3	Transmit contact target	
2.7.18.12.4	Transmit tally target	
2.7.18.13	Confirm target	Do 1-4 in order as required.

#	Task	Plan
2.7.18.13.1	Receive request for target area description	
2.7.18.13.2	Transmit target area description to FAC	
2.7.18.13.3	Receive further questions about target area	
2.7.18.13.4	Transmit answers to questions	
2.7.18.13.5	Receive concurrence from FAC	
2.7.18.14	Transmit confirm attack heading	
2.7.18.15	Receive confirmed attack heading	
2.7.18.16	Transmit ROGER WILCO	
2.7.19	Receive attack clearance	Do 1 and 2 in order, then either do 3 and 4 or do 5.
2.7.19.1	Receive attack clearance and conditions	
2.7.19.2	Transmit ROGER WILCO	
2.7.19.3	Transmit in hot plus heading	
2.7.19.4	Receive cleared hot	
2.7.19.5	Transmit off hot	
2.7.20	Release weapons	
2.7.21	Perform BDA	Do 1-11 in order as required.
2.7.21.1	Record who dropped the weapons	
2.7.21.2	Record time weapons went off (impact)	
2.7.21.3	Record weapon type	
2.7.21.4	Record the number of weapons released	
2.7.21.5	Record position of target that was under attack	
2.7.21.6	Assess weapons effects on target	Do 1-6 in any order as required.
2.7.21.6.1	Use unaided eyes to gather information	
2.7.21.6.2	Operate onboard sensors to gather information	
2.7.21.6.3	Determine whether target was hit	
2.7.21.6.4	Determine whether target was missed	
2.7.21.6.5	Determine whether target was destroyed	
2.7.21.6.6	Determine whether target was immobilised	
2.7.21.7	Record weapons effects on target	
2.7.21.8	Record any other related or useful information	
2.7.21.9	Transmit request for RECCE pass (if needed)	
2.7.21.10	Transmit BDA update to FAC	

#	Task	Plan
2.7.21.11	Confirm BDA with FAC	
2.7.22	Transmit request for BDA and orders	Do 1-10 in order as required.
2.7.22.1	Receive BDA	
2.7.22.2	Receive BDA	Do 1-4 in any order as required.
2.7.22.2.1	Receive BDA from FAC	
2.7.22.2.2	Receive BDA from FAC(A)	
2.7.22.2.3	Receive BDA from RECCE	
2.7.22.2.4	Receive BDA from AWACS	
2.7.22.3	Transmit request to confirm that BDA is correct	
2.7.22.4	Receive confirmation that information is correct	
2.7.22.5	Receive corrections	
2.7.22.6	Determine remaining playtime	Do 1 and 2 in any order as required.
2.7.22.6.1	Determine remaining fuel	
2.7.22.6.2	Determine remaining ordnance	
2.7.22.7	Receive FAC authorisation to return to orbiting position	Do 1-6 as directed.
2.7.22.7.1	Return to IP	
2.7.22.7.2	Return to within visual range of target but not overhead, (Offset Racetrack)	
2.7.22.7.3	Return to overhead target (Wheel)	
2.7.22.7.4	Return to Keyhole	
2.7.22.7.5	Return to Keypad	
2.7.22.7.6	Transit to receive AAR as required/scheduled	
2.7.22.8	Receive FAC authorisation to re-attack	
2.7.22.9	Receive FAC authorisation to egress	
2.7.22.10	Receive FAC authorisation to proceed to next target	
2.7.23	Receive FAC authorisation to egress	
2.7.24	Transmit confirmation	
2.8	Abort CAS mission	Do 1, then do 2, do 3 as required.
2.8.1	Detect conditions that require abort	Do 1-7 in any order as required.
2.8.1.1	Determine if weather is inappropriate for weapons type	
2.8.1.2	Determine if weather makes positive target ID impossible	
2.8.1.3	Determine if Enemy Air defense threat is too high	
2.8.1.4	Determine if ground situation no longer appropriate for	

#	Task	Plan
	CAS mission	
2.8.1.5	Determine if better Aircraft is available for mission	
2.8.1.6	Determine if fuel is insufficient to complete mission	
2.8.1.7	Receive re-tasking to more pressing CAS or other mission	
2.8.2	Transmit abort	
2.8.3	Receive orders from FAC to abort CAS mission	
2.9	Return to base	Do 1-19 in order as required.
2.9.1	Check out with FAC	Do 1 and 2 in order.
2.9.1.1	Confirm BDA is correct for all attacks conducted	
2.9.1.2	Get pushed to TACP	
2.9.2	Check out with TACP	Do 1-7 in order.
2.9.2.1	Transmit call to TACP	
2.9.2.2	Receive request for authentication	
2.9.2.3	Transmit authentication	
2.9.2.4	Pass BDA report	
2.9.2.5	Pass any information to update SU	
2.9.2.6	Receive safe passage information	
2.9.2.7	Get pushed to ASOC	
2.9.3	Check out with ASOC	Do 1-8 in order.
2.9.3.1	Transmit call to ASOC	
2.9.3.2	Receive request for authentication	
2.9.3.3	Transmit authentication	
2.9.3.4	Pass BDA report	
2.9.3.5	Pass any information to update SU	
2.9.3.6	Provide weather information if appropriate	
2.9.3.7	Receive safe passage information	
2.9.3.8	Get pushed to AWACS	
2.9.4	Conduct Fence out Checks	Do 1-4 in any order.
2.9.4.1	Disable weapons systems	
2.9.4.2	Disable self defense suite	
2.9.4.3	Change volume on Radar warning receiver	
2.9.4.4	Perform a Battle damage check with wingman	
2.9.5	Check out with AWACS	Do 1-9 in order as required.

#	Task	Plan
2.9.5.1	Transmit call to AWACS	
2.9.5.2	Receive request for authentication	
2.9.5.3	Transmit authentication	
2.9.5.4	Transmit Mission Report (MISREP)	
2.9.5.5	Transmit BDA	
2.9.5.6	Pass any information to update SU	
2.9.5.7	Receive safe passage information	
2.9.5.8	Receive AAR information if required/scheduled	
2.9.5.9	Get pushed to civilian control or base control	
2.9.6	Check in with Squadron Ops	Do 1-7 in order as required.
2.9.6.1	Transmit call to Squadron Ops	
2.9.6.2	Receive request for authentication	
2.9.6.3	Transmit authentication	
2.9.6.4	Transmit MISREP	Do 1.
2.9.6.4.1	Transmit BDA	
2.9.6.5	Receive Base weather and runway conditions	
2.9.6.6	Transmit Aircraft serviceability	
2.9.6.7	Transmit pertinent information to follow on CAS fighters (eg. weather)	
2.9.7	Land	
2.9.8	De-arm	
2.9.9	Taxi to ramp	
2.9.10	Shutdown aircraft	
2.9.11	Communicate to ground crew any issues/problems with the aircraft	
2.9.12	Perform debrief at Ops desk	
2.9.13	Get undressed	
2.9.14	Return NVGs	
2.9.15	Return Personal Weapon	
2.9.16	Account for all ammunition	
2.9.17	Return mission packs	
2.9.18	Perform debriefs	Do 1-3 in order as required.
2.9.18.1	Debrief GLO on what you saw and results of your mission	

#	Task	Plan
2.9.18.2	Debrief Intelligence Officer on enemy activity	Do 1 and 2 in order.
2.9.18.2.1	Provide Intelligence Report (INTREP)	Do 1-4 in any order.
2.9.18.2.1.1	Electronic warnings received	
2.9.18.2.1.2	Attempted shoot-downs	
2.9.18.2.1.3	Sighted missile launches	
2.9.18.2.1.4	Any other useful intelligence	
2.9.18.2.2	Identify any errors/omissions from initial INTEL brief	
2.9.18.3	Debrief Wingman	Do 1-7 in order as required.
2.9.18.3.1	Review mission	
2.9.18.3.2	Identify errors	
2.9.18.3.3	Identify root causes of errors	
2.9.18.3.4	Develop lessons learned	
2.9.18.3.5	Identify ways to improve	
2.9.18.3.6	Provide feedback to wingman	
2.9.18.3.7	Receive feedback from wingman	
2.9.19	Enjoy some suds at the mess.	

Annex C – BARS

C.1 Determine Air Assets

C.1.1 Communication

How effective was information exchange?	
5	FAC communicated with all available resources (G2/G3 plans) about all key info (e.g. Cdr's orders, CAS line-up for the day), and 'big picture' situation updates in a timely manner.
4	FAC communicated with all available resources about key info in a timely manner but did not communicate about big picture updates.
3	FAC sought relevant key info on SU from available resources reactively (after it became clear he did not have it).
2	FAC sought only some SU info, or failed to consult some key resources.
1	FAC did not seek any SU info from any sources.

Was communication economical?	
5	Team member used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	Team member used standard brevity codes and communications procedures, and communicated audibly, but there were a few requests to clarify utterances
3	Team member used standard brevity codes and communications procedures, but did not always communicate audibly and were required to repeat or clarify sometimes.
2	Team members did not always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition.
1	Team members consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled.

C.1.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a complete common understanding of CAS mission, higher intent, team status, resources and TTPs regarding the determination of air assets required to achieve desired effects.
4	Team members coordinated explicitly and effectively (i.e., asked questions, checked assumptions without slowing down the task significantly), and achieved/maintained acceptable common understanding of CAS mission, higher intent, team status, resources and TTPs.
3	Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of a significant portion of CAS mission, higher intent, team status, resources and TTPs regarding the determination of air assets required to achieve desired effects.
2	Team members made a few explicit attempts at coordinating knowledge (e.g., asked each other a few questions), but only achieved an incomplete common understanding of CAS mission, higher intent, team

	status, resources and TTPs regarding the determination of air assets required to achieve desired effects.
1	Team members failed to achieve a common understanding of re. CAS mission, higher intent, team status, resources and TTPs regarding the determination of air assets.

C.1.3. Cooperation

To what extent were team members working toward the same ends?	
5	Team members used and cross-checked each other's info; exhibited 'give-and-take' behaviours (e.g., person in best position to give relevant info did so). The team was able to determine air assets.
4	Team members used and cross-checked most of each other's info, and exhibited some give-and-take behaviours. The team was able to determine air assets.
3	Team members received each other's info but did not use it and failed to determine air assets. However they exhibited give-and-take behaviours when needed.
2	Team members shared info with FAC and/or pilot but did not communicate with others and determined air assets independently (includes FAC & pilot). They did not exhibit give-and-take behaviours.
1	Team members failed to communicate with each other to determine air assets, they did not exhibit give-and-take behaviours and FAC failed to determine air assets.

How effective were the FAC/others as a team?	
5	FAC/Pilot took each other SOPs, brief & remarks info at face value without undue questioning (i.e. questioned only when a clarification was required), and unhesitatingly accepted each other's corrections/clarifications, and trusted each other to have sufficient SA to support SOPs.
4	FAC/others did not question each other's info (re. ordnance, aircraft, numbers, and playtimes required), and accepted corrections easily; but hesitated somewhat before accepting that info or that their SA supported that info, CAS info gets into the ATO in a timely manner.
3	FAC/others questioned each other's info, and/or that the other has sufficient SA, delaying the determination of air assets without major operational effects and the integration of CAS info with the ATO.
2	FAC/others extensively questioned each other's info & supporting SA, significantly delaying the exchange of relevant info, CAS info failed to get into the ATO, potentially affecting the outcome of the mission.
1	FAC/others consistently rejected each other's info, and discounted each other's supporting SA, CAS info failed to get into ATO.

C.2 Understand Situation (Blue, Red, White, Brown)

Key:

B: Blue Situation updates (SU); Key Blue info: footprint of CF forces, coalition forces, ANA forces, and SOF, etc.

R: Red SU; Key Red info: location, weaponry, CONOP, size of force, organisation of force, and cover

W: White SU; Key White info: civilians, non-combatants such as NGOs and VIPs, ANP, local landmarks

Br: Brown SU; Key Brown info: weather, terrain, and location which could be exploited as opportunities for cover, concealment, movement, observation and comms (e.g., line-of-sight problems)

Key resources/teammembers: FAC, Coy Cdr, G3 plans, FSCC, FOO, Higher Cmd, pilot, ASOC, AWACS

C.2.1 Communication

How effective was information exchange?	B	R	W	Br
FAC communicated with all available resources about all key info, and 'big picture' situation updates in a timely manner.	5	5	5	5
FAC communicated with all available resources about key info in a timely manner but did not communicate about big picture updates.	4	4	4	4
FAC sought relevant key info on SU from available resources reactively (after it became clear he did not have it).	3	3	3	3
FAC sought only some SU info, or failed to consult some key resources.	2	2	2	2
FAC did not seek any SU info from any sources.	1	1	1	1

Was communication economical?	B	R	W	Br
Team member used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.	5	5	5	5
Team member used standard brevity codes and communications procedures, and communicated audibly, but there were a few requests to clarify utterances	4	4	4	4
Team member used standard brevity codes and communications procedures, but did not always communicate audibly and were required to repeat or clarify sometimes.	3	3	3	3
Team members did not always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition.	2	2	2	2
Team members consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled.	1	1	1	1

Did closed-looped communication go as expected?	B	R	W	Br
Team members acknowledged requests from others, verified whether sent info was understood as intended, and collaborated with all relevant team members to build and maintain situation awareness (SA).	5	5	5	5
Team members acknowledged requests from others, and verified whether sent info was understood as intended, but collaborated with only some relevant team members to build and maintain SA.	4	4	4	4
Team members acknowledged requests from others, and verified whether sent info was understood as intended, but did not collaborate with team members to build and maintain SA.	3	3	3	3
Team members acknowledged requests from others, but did not communicate with other team members to build SA, and did not verify whether sent info was understood as intended.	2	2	2	2
Team members did not acknowledge requests from others, did not communicate with other team members to build SA, and did not verify whether sent info was understood as intended.	1	1	1	1

C.2.2 Coordination

How well were team members' knowledge requirements managed?	B	R	W	Br
Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a complete common understanding of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area.	5	5	5	5
Team members coordinated explicitly and effectively (i.e., asked questions, checked assumptions without slowing down the task significantly), and achieved/maintained acceptable common understanding of CAS mission, higher intent, team status, resources and TTPs.	4	4	4	4

Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of a significant portion of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area	3	3	3	3
Team members made a few explicit attempts at coordinating knowledge (e.g., asked each other a few questions), but only achieved an incomplete common understanding of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area	2	2	2	2
Team members failed to achieve a common understanding of r CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area.	1	1	1	1

How well did the team members monitor each other's performance?	B	R	W	Br
Team members monitored other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources regarding the relevant SU area.	5	5	5	5
Team members monitored other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.	4	4	4	4
Team members monitored other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.	3	3	3	3
Team members observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.	2	2	2	2
Team members did not observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources regarding SU area.	1	1	1	1

How adaptable were team members to the changing demands of the situation?	B	R	W	Br
Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.	5	5	5	5
Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.	4	4	4	4
Team members monitored other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.	3	3	3	3
Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.	2	2	2	2
Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.	1	1	1	1

C.2.3 Cooperation

To what extent were team members working toward the same ends?	B	R	W	Br
Team members used and cross-checked each other's info; exhibited 'give-and-take' behaviours (e.g., person in best position to give SU did so). As a result the team was able to maintain accurate and shared SA and the FAC was able to orient the pilot to relevant situations.	5	5	5	5
Team members used and cross-checked most of each other's info, and exhibited some give-and-take behaviours. They nonetheless failed to maintain accurate and shared SA, however the FAC was still able to orient the pilot to relevant situations sufficiently to complete task.	4	4	4	4
Team members received each other's info but did not use it and failed to maintain shared SA. However they exhibited give-and-take behaviours when needed and the FAC or pilot maintained sufficient SA to complete task.	3	3	3	3
Team members shared SA with FAC and/or pilot but did not communicate with others and built SA independently (includes FAC & pilot). They did not exhibit give-and-take behaviours and FAC failed to orient pilot to relevant situations.	2	2	2	2
Team members failed to communicate with each other build their own SA, they did not exhibit give-and-take behaviours and FAC failed to orient pilot to relevant situations.	1	1	1	1

How effective were FAC/others as a team?	B	R	W	Br
Team members accepted each others' SU information face value and without undue questioning (i.e., no more than warranted by communications needs) and did not take any undue unilateral measures to insulate themselves from others' decisions or errors (e.g., FAC did not systematically inflate distances provided by Coy Cmdr).	5	5	5	5
Team members accepted each others' SU information face value and without undue questioning, but they occasionally took some minor unilateral measures to insulate themselves from errors or decisions by others.	4	4	4	4
Team members questioned each others' SU information to some degree, but ultimately accepted most of each others' information decisions and only occasionally took unilateral measures to insulate themselves from errors or decisions by others.	3	3	3	3
Team members frequently questioned each others' information and/or decisions and took unilateral measures to insulate themselves from errors or decisions by others; they sometimes unduly tried to correct perceived errors in each others' information.	2	2	2	2
Team members consistently rejected each others' SU information, attempted to correct each other's SU information, and took unilateral actions to insulate themselves from perceived errors and incompetence from other members.	1	1	1	1

C.3 Understand Time

C.3.1 Communication

How effective was information exchange?	
5	FAC communicated with all available resources about all key time info (e.g. current time, time elapsed since significant point in time, time available to perform some activity), and 'big picture' situation updates in a timely manner.
4	FAC communicated with all available resources about key info in a timely manner but did not communicate about big picture updates.
3	FAC sought relevant key info on time from available resources reactively (after it became clear he did not have it).
2	FAC sought only some time info, or failed to consult some key resources.
1	FAC did not seek any time info from any sources.

Was communication economical?	
5	Team member used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	Team member used standard brevity codes and communications procedures, and communicated audibly, but there were a few requests to clarify utterances
3	Team member used standard brevity codes and communications procedures, but did not always communicate audibly and were required to repeat or clarify sometimes.
2	Team members did not always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition.
1	Team members consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled.

Did closed-looped communication go as expected?	
5	Team members acknowledged requests from others, verified whether sent info was understood as intended, and collaborated with all relevant team members to understand time.
4	Team members acknowledged requests from others, and verified whether sent info was understood as intended, but collaborated with only some relevant team members to understand time.
3	Team members acknowledged requests from others, and verified whether sent info was understood as intended, but did not collaborate with team members to understand time.
2	Team members acknowledged requests from others, but did not communicate with other team members to understand time, and did not verify whether sent info was understood as intended.
1	Team members did not acknowledge requests from others, did not communicate with other team members to understand time, and did not verify whether sent info was understood as intended.

C.3.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a complete common understanding of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area.
4	Team members coordinated explicitly and effectively (i.e., asked questions, checked assumptions without slowing down the task significantly), and achieved/maintained acceptable common understanding of CAS mission, higher intent, team status, resources and TTPs.
3	Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of a significant portion of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area
2	Team members made a few explicit attempts at coordinating knowledge (e.g., asked each other a few questions), but only achieved an incomplete common understanding of CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area
1	Team members failed to achieve a common understanding of r CAS mission, higher intent, team status, resources and TTPs regarding relevant SU area.

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members, detected when others made errors (e.g. out of sync, failed to keep time committments), and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources.
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members failed to observe the behaviours and actions of other team members, failed to detect when others made errors while building an understanding of time, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How effective was back-up behaviour?	
5	More than one team member requested/provided assistance as needed [to understand coordination] in a timely manner; team members explicitly corrected each other's errors, recognised when one performed exceptionally well.
4	More than one team member requested assistance as needed, team members explicitly challenged each other as mistakes were detected but failed to correct them as necessary.
3	Only one team member transmitted a request assistance, team members implicitly corrected each other's errors but some errors were missed.

2	Those team members who recognised the need for support failed to request assistance; assumed other team member(s) would request assistance, detected errors made by others but failed correct them.
1	Team members failed to recognise the need to request assistance, failed to detect/correct other's errors.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.4 Maintain Personal Safety

C.4.1 Communication

How effective was information exchange?	
5	FAC communicated with all available resources about all key info re. personal safety (e.g. risk to self, requirements to leave cover of LAV, benefit of exposing self to risk, own location, location of friendlies, need to remove protective equipment), and 'big picture' situation updates in a timely manner.
4	FAC communicated with all available resources about key info in a timely manner but did not communicate about big picture updates.
3	FAC sought relevant key info from available resources reactively (after it became clear he did not have it).
2	FAC sought only some info, or failed to consult some key resources.
1	FAC did not seek any info from any resources.

C.4.2 Coordination

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources.
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.

2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members did not observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How effective was back-up behaviour?	
5	More than one team member requested/provided assistance as needed [to maintain personal safety] in a timely manner; team members explicitly corrected each other's errors, recognised when one performed exceptionally well.
4	More than one team member requested assistance as needed, team members explicitly challenged each other as mistakes were detected but failed to correct them as necessary.
3	Only one team member transmitted a request assistance, team members implicitly corrected each other's errors but some errors were missed.
2	Those team members who recognised the need for support failed to request assistance; assumed other team member(s) would request assistance, detected errors made by others but failed correct them.
1	Team members failed to recognise the need to request assistance, failed to detect/correct other's errors.

C.4.3 Cooperation

To what extent did team members display mutual trust?	
5	Team members were always available when needed, exhibited full confidence in each other's skills to get this task done, depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members were usually available when needed, were confident in each other's skills to get this task done, followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info freely.
3	Team members attempted to make themselves available when needed, challenged each other as required, were confident in each other's skills to get this task done but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties.
2	Team members were indifferent to each other's needs, were not confident in each other's skills to get this task done, were confrontational and antagonistic, broke promises, and resisted to share info freely.
1	Team members were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done, always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.5 Transmit Immediate CAS Request

C.5.1 Communication

How effective was information exchange?	
5	FAC sent/received immediate CAS request to/from all available resources (ASOC and FSCC), included all key info (e.g. request for specific aircraft, ordnance/effect type, and priority), and 'big picture' situation updates in a timely manner.
4	FAC sent/received immediate CAS request to/from all available resources (ASOC and FSCC), included all key info (e.g. request for specific aircraft, ordnance/effect type, and priority) in a timely manner but failed to provide 'big picture' situation updates.
3	FAC requested/received some key info from available resources reactively (after it became clear he failed to have it).
2	FAC sent/received immediate CAS request but failed to provide any info re. (e.g. request for specific aircraft, ordnance/effect type, and priority), or failed to consult available resources.
1	FAC failed to send/receive immediate CAS request to/from any resources.

Was communication economical?	
5	Team members (FAC, ASOC, FSCC) used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	Team members (FAC, ASOC, FSCC) used standard brevity codes and communications procedures, and communicated audibly, but there were a few requests to clarify utterances.
3	Team members (FAC, ASOC, FSCC) used standard brevity codes and communications procedures, but failed to always communicate audibly and were required to repeat or clarify sometimes.
2	Team members (FAC, ASOC, FSCC) failed to always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition.
1	Team members (FAC, ASOC, FSCC) consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled.

Did closed-looped communication go as expected?	
5	ASOC/FSCC acknowledged immediate CAS request from FAC, FAC verified that sent info was understood as intended, and all relevant team members collaborated effectively to build and maintain SA.
4	ASOC/FSCC acknowledged immediate CAS request from FAC, FAC verified that sent info was understood as intended, but only some relevant team members collaborated to build and maintain SA.
3	ASOC/FSCC acknowledged immediate CAS request from FAC, FAC verified that sent info was understood as intended, but failed to collaborate with team members to build and maintain SA.
2	ASOC/FSCC acknowledged immediate CAS request from FAC, FAC failed to verify whether sent info was understood as intended or communicate with other team members to build SA.
1	ASOC/FSCC failed to acknowledge immediate CAS request from FAC.

C.5.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members (FAC, ASOC, FSCC) implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a common understanding of the immediate CAS request.
4	Team members (FAC, ASOC, FSCC) coordinated implicitly and effectively, but still failed to achieve a common understanding of the immediate CAS request.
3	Team members (FAC, ASOC, FSCC) made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved common understanding of the immediate CAS request.
2	Team members (FAC, ASOC, FSCC) made explicit attempts at coordinating knowledge, and achieved an incomplete common understanding of immediate CAS request.
1	Team members (FAC, ASOC, FSCC) failed to display a common understanding of the immediate CAS request.

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources. [while building SA pertaining to the immediate CAS request]
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members failed to observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How effective was back-up behaviour?	
5	More than one team member (FAC, ASOC, FSCC) requested/provided immediate CAS as needed in a timely manner; team members explicitly corrected each other's errors while building shared SA, recognised when one performed exceptionally well.
4	More than one team member requested immediate CAS as needed, team members explicitly challenged each other as mistakes were detected but failed to necessarily correct them.
3	Only one team member transmitted a request for immediate CAS, team members implicitly corrected each other's errors while building SA but some knowledge requirements were missed.

2	Those team members (e.g. ASOC/FSCC/Coy Cdr) who recognised the need to request immediate CAS failed to make the call; assumed other team member(s) would make the call, detected errors made by others but failed correct them.
1	Team members failed to recognise the need for immediate CAS (request not sent), failed to detect/correct other's errors.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.5.3 Cooperation

To what extent were team members working toward the same ends?	
5	Team members were collectively motivated, evaluated/used all key inputs from other team members in a timely manner (e.g. FAC sent request for immediate CAS to ASOC, included all relevant info, FAC/ASOC collectively evaluated info, created/sent complete 9 line to pilot prior to arrival of aircraft at IP/BP), exhibited 'give-and-take' behaviours, and worked effectively together to send the best possible support immediately.
4	Team members were collectively motivated, evaluated/used most key inputs from other team members (e.g. FAC sent request to ASOC, included partial 9 line which ASOC sent to pilot before arrival at BP/IP).
3	Team members were collectively motivated, showed an ability to coordinate, a good amount of time was spent analysing inputs, some key inputs were used, however 9-line info failed to make it to aircraft before arrival at BP/IP, the best possible support was sent but not immediately.
2	Team members were collectively motivated but showed a reluctance to coordinate information requirements with sufficient lead time for planning purposes and a significant amount of time was spent analysing inputs (e.g. FAC sent immediate CAS request to ASOC/FSCC but ASOC/FSCC failed to relay that info to pilot, i.e. FAC provided same info again during check-in).
1	FAC failed to request immediate CAS but received unscheduled/unplanned CAS assets.

To what extent did team members exhibit mutual trust?	
5	Team members (FAC, Coy Cdr, FOO, pilot) were always available when needed, exhibited full confidence in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members (FAC, Coy Cdr, FOO, pilot) were usually available when needed, were confident in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info (e.g. location of blue forces, type of air support to be expected, info re. artillery) freely.
3	Team members (FAC, Coy Cdr, FOO, pilot) attempted to make themselves available when needed, challenged each other as required, were confident in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points) but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties (e.g. location of blue forces, type of air support to be expected, info re. artillery).
2	Team members (FAC, Coy Cdr, FOO, pilot) were indifferent to each other's needs, were not confident the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), were confrontational and antagonistic, broke promises, and resisted to share info (e.g. location of blue forces, type of air support to be expected, info re. artillery) freely.
1	Team members (FAC, Coy Cdr, FOO, pilot) were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done, always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.6 Receive Pilot's Scheduled Check-in

C.6.1 Communication

How effective was information exchange?	
5	FAC/Pilot passed all check-in, authentication, abort code and situation update (Blue, Red, White, Brown) info in a timely manner before being asked.
4	FAC/Pilot passed most key info in a timely manner, omitting minor elements (e.g. authentication) without operational impact (relative to SOPs).
3	FAC/Pilot gave big picture info but omitted some crucial SU info.
2	F/P failed to exchange big picture and some crucial SU info.
1	F/P failed to exchange crucial SU info at all.

Was information exchange economical?	
5	FAC/Pilot used proper callsign authentication protocol (including using secure comms & security abbreviations if available/required), & standard SU format communicated audibly at all times and in a timely manner with no repetitions over a secure network (if available).
4	FAC/Pilot used proper authentication procedures & mostly standard terminology, and communicated audibly most of the time, repeating items infrequently; however this did not significantly prolong the check-in.
3	FAC/Pilot used proper authentication procedures, standard terminology and communicated audibly most of the time, but had to repeat items sometimes, prolonging the check-in
2	FAC/Pilot communicated audibly most of the time, but had to repeat items frequently, prolong the check-in, and failed to use proper authentication protocol (including failing to follow security procedures as required/available).
1	FAC/Pilot failed to use proper authentication protocol and did not communicate audibly, requiring frequent repetitions and significantly prolonging the check-in.

Did closed-looped communication go as expected?	
5	FAC/Pilot acknowledged each other's requests, verified whether sent info was understood as intended, and collaborated to make sure check-in & situation update (SU) were properly received & understood.
4	FAC/Pilot acknowledged each other's requests, and verified whether sent info was understood as intended, but compensated unilaterally for errors by other (without correcting other).
3	FAC/Pilot acknowledged each other's requests, and verified whether sent info was understood as intended, but did not detect or correct errors by other.
2	FAC/Pilot acknowledged each other's requests, and receipt of info but did not verify whether info was understood as intended, and failed to detect or correct others.
1	TFAC/Pilot failed to acknowledge each other's requests and receipt of info, to verify whether info was understood as intended, and to detect or correct other's errors.

C.6.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a complete common understanding of the CAS mission, commander's intent, team, and resources available to them.
4	Team members coordinated explicitly and effectively (e.g., checked assumptions without causing major delays), and achieved acceptable common understanding of the following: CAS mission, commander's intent, team, and resources available to them.
3	Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of a significant portion of the following: CAS mission, commander's intent, team, and resources available to them.
2	Team members made a few explicit attempts at coordinating knowledge (e.g., asked each other questions), but only achieved an incomplete common understanding of the CAS mission, commander's intent, team, and resources available to them.
1	Team members failed to achieve a common understanding of the CAS mission, higher commander's intent, task, team, and resources available to them

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources.
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members did not observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and did not complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.7 Deconflict Target Area and Airspace

C.7.1 Communication

How effective was information exchange?	
5	FAC exchanged deconfliction info (e.g., locations of blue forces, Blue air including air support and MEDEVAC, info about artillery including firing location, firing rate, remaining duration of firing, max ordnance) with all available resources (e.g., Coy Cdr, pilots, and FSCC), and 'big picture' situation updates in a timely manner.
4	FAC exchanged deconfliction info with available resources info in a timely manner but did not exchange big picture updates.
3	FAC exchanged relevant key deconfliction info with available resources reactively (only after one party requested it).

2	FAC exchanged only some deconfliction info, or exchanged info with only some key resources; other key info was exchanged too late or not at all.
1	FAC did not exchange seek any deconfliction info with sources.

Was communication economical?	
5	Team member used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	Team member mostly used standard brevity codes and communications procedures, and communicated audibly; discrepancies did not require repetition/clarification.
3	Team member sometimes did not use standard brevity codes and communications procedures, and did not always communicate audibly, requiring occasional repetition/clarification.
2	Team members did not always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition, delaying task.
1	Team members consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled, compromising task.

Did closed-looped communication go as expected?	
5	Team members (FAC, FSCC, Coy Cdr, Pilots) acknowledged requests from others, always verified receipt of info, that info was understood as intended, and covered all mission elements in great detail.
4	Team members acknowledged requests from others; they usually verified receipt of info and that info was understood as intended, and covered many mission elements with acceptable detail.
3	Team members acknowledged requests from others, and usually verified receipt of info and that info was understood as intended; most mission elements were covered but some inconsistent details remained.
2	Team members verified receipt of info that was sent; however they did not verify whether info was understood as intended not acknowledge requests from others; most mission were covered nevertheless.
1	Team members failed to acknowledge requests from others, and whether the info they sent was received or understood as intended; few mission elements were covered and closed-loop communications were ineffective.

C.7.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members (FAC, Pilots, FSCC, Coy Cdr) implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a complete common understanding of the deconfliction situation (e.g., locations of blue forces, Blue air including air support and MEDEVAC, info about artillery).
4	Team members coordinated explicitly (e.g. discussed a/c timing options) and effectively, and achieved acceptable common understanding of the deconfliction situation with little effort.
3	Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of a significant portion of the deconfliction situation.

2	Team members made a few explicit attempts at coordinating knowledge (e.g., asked each other questions), but only achieved an incomplete common understanding of the deconfliction situation.
1	Team members failed to achieve a common understanding of the deconfliction situation.

How well did the team members monitor each other's performance?	
5	Team members (FAC, Pilots, FOO, Coy Cdr) observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's.
4	Team members observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings but were only minimally aware of others' surroundings.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they were unaware of their own or other's surroundings.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings.
1	Team members did not observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings.

How effective was back-up behaviour?	
5	Team members (FAC, Pilots, FSCC, Coy Cdr) challenged each other and corrected each other's deconfliction errors, and provided and requested assistance when needed (e.g. FAC vectored aircraft about to enter air defence airspace) without being asked.
4	Team members (FAC, Pilots, FOO, Coy Cdr) corrected each other's errors upon receipt of info but did not challenge each other, and provided and requested assistance when needed.
3	Team members (FAC, Pilots, FOO, Coy Cdr) corrected each others errors upon receipt of info but did not challenge each other, and provided assistance but did not request assistance when needed.
2	Team members (FAC, Pilots, FOO, Coy Cdr) corrected each others errors upon receipt of info without challenging each other, but neither provided not requested assistance when needed.
1	Team members (FAC, Pilots, FOO, Coy Cdr) failed to correct each other's errors, and to provide or request assistance when needed.

How adaptable were team members to the changing demands of the situation?	
5	As the demands of the situation increased (e.g., MEDEVAC arrived on station), team members reallocated workload dynamically, compensated for others and adjusted their strategies; the FAC managed to effectively calculate ideal: safe distances, artillery radials, airspace blocks (max ordnance) attack headings, attack profile, and egress headings.
4	As the demands of the situation increased, team members usually reallocated workload dynamically, compensated for others and adjusted their strategies, and FAC calculated adequate but less than ideal : safe distances, artillery radials, airspace blocks (max ordnance) attack headings, attack profile, and egress headings.

3	As the demands of the situation increased, team members often reallocated workload dynamically, and attempted (not always successfully) to compensate for others and to adjust their strategies to the situation; the FAC accurately calculated some but not all of required: safe distances, artillery radials, airspace blocks (max ordnance) attack headings, attack profile, and egress headings.
2	As the demands of the situation increased, team members showed some ability to reallocate workload dynamically, but often did not compensate for others or adjust their strategies to the situation; the FAC failed to calculate most of: safe distances, artillery radials, airspace blocks (max ordnance) attack headings, attack profile, and egress headings.
1	As the demands of the situation increased, team members failed to reallocate work dynamically, did not compensate for other or adjust their strategies to the situation; the FAC failed to calculate: safe distances, artillery radials, airspace blocks (max ordnance) attack headings, attack profile, and egress headings.

C.7.3 Cooperation

To what extent were team members working toward the same ends?	
5	Team members collectively developed a deconfliction plan that allowed maximum effects (arty, CAS air) to be kept on the target as much as possible in a timely manner while ensuring safety of all (Blue ground, FAC, CAS air, CASEVAC if needed); plan was achieved with a minimum of friction (little or no arguing & disagreements, or unnecessary questioning of plans or intentions).
4	Team members generally worked well together to develop common deconfliction plan that balanced most goals in a satisfactory way, but some members deferred minor aspects of their deconflict goals (e.g. arty accepted check fires for brief period rather than continuous fires during), and/or the exchanges displayed some tension or minor disagreements.
3	Some team members attempted to impose some goals while others did not advocate their goals strongly; as a result they developed a plan that met a few key common deconfliction objectives but compromised others to some degree (e.g. CASEVAC was significantly delayed but no one died as a result).
2	Team members failed to agree on principal deconfliction priorities, and proceeded with individual goals after unsuccessful & acrimonious attempts at engaging others; a subset of deconfliction goals prevailed (e.g. CAS weapons drop), significantly compromising other aspects of deconfliction (e.g. CASEVAC critically delayed, endangering the lives of casualties).
1	Team members failed to develop a common deconfliction plan, and independently attempted to achieve individual effects (e.g. arty fires) or safety objectives (CASEVAC) at the expense of other deconfliction objectives; as a result, individual effects or safety tasks entered into conflict were severely compromised (were not executed or were completely unsuccessful).

How effective were FAC/others as a team?	
5	Team members accepted each others' information and decisions about deconfliction at face value and without undue questionning (i.e., no more than warranted by TTPs) and did not take any undue unilateral measures to insulate themselves from others' decisions or errors (e.g., FAC did not add more padding than warranted to MAXORD when defining altitude blocks for CAS aircraft); they made no attempt to interfere in each others' deconfliction decisions (e.g., FSCC did not suggest aircraft deconfliction techniques to FAC).

4	Team members accepted each other's information and deconfliction decisions without undue questionning, and did not attempt to micromanage each other's deconfliction decisions, but they occasionally took a few unilateral measures to insulate themselves from errors or decisions by others.
3	Team members questioned each others' deconfliction information and/or decisions to some degree, but ultimately accepted most of each others' decisions and only occasionally took unilateral measures to insulate themselves from errors or decisions by others.
2	Team members frequently questioned each others' information and/or decisions and took unilateral measures to insulate themselves from errors or decisions by others; they sometimes unduly tried to correct perceived errors in each others' deconfliction tasks.
1	Team members consistently rejected each others' deconfliction information and decisions, attempted to perform each others' decisions without each other's consent (e.g., FSCC suggested aircraft deconfliction techniques to FAC), and took unilateral actions to insulate themselves from perceived errors and incompetence from other members (e.g., FAC consistently selected larger-than-necessary altitude blocks to keep aircraft away from each other or UAVs).

To what extent did team members exhibit mutual trust?	
5	Team members (FAC, Coy Cdr, FOO, pilot) were always available when needed, exhibited full confidence in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members (FAC, Coy Cdr, FOO, pilot) were usually available when needed, were confident in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info (e.g. location of blue forces, type of air support to be expected, info re. artillery) freely.
3	Team members (FAC, Coy Cdr, FOO, pilot) attempted to make themselves available when needed, challenged each other as required, were confident in the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points) but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties (e.g. location of blue forces, type of air support to be expected, info re. artillery).
2	Team members (FAC, Coy Cdr, FOO, pilot) were indifferent to each other's needs, were not confident the FAC's skills to get this task done (to calculate: safe distances, artillery radials, airspace blocks, attack headings, attack profile, and egress heading; and to select holding points), were confrontational and antagonistic, broke promises, and resisted to share info (e.g. location of blue forces, type of air support to be expected, info re. artillery) freely.
1	Team members (FAC, Coy Cdr, FOO, pilot) were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done, always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.8 Transmit CAS Brief & Communicate Remarks

C.8.1 Communication

How effective was information exchange?	
5	FAC passed complete and accurate brief (following theatre standard), & provided all key remarks info (e.g., weapons effects, attack geometry, ACA measures, number of attempts, level of risk for blue and white forces, danger close initials).
4	FAC passed all items of brief and all most key remarks but provided some remarks only when prompted (e.g. danger close initials)
3	FAC passed all items of brief & remarks available to him but had to communicate with others to obtain missing info requested by pilot (e.g. MAXORD, ACA measures)
2	FAC omitted important brief & remarks items that were available to him.
1	FAC failed to provide sufficient brief & remarks for pilot to complete mission.

Was information exchange economical?	
5	FAC/Pilot used standard brevity codes & brief/remarks formats, and communicated audibly and in a timely fashion, requiring no corrections/repetitions.
4	FAC/Pilot almost always used standard codes & formats, and generally communicated audibly, without requiring corrections/repetitions.
3	FAC/Pilot standard codes & formats, and communicated audibly most of the time, but sometimes had to repeat items, delayed readback or remarks, or provided excess information (e.g. too much on readback) prolonging the CAS brief with no impact on mission.
2	FAC/Pilot used a number of non-standard items, provided excess information and/or garbled communications frequently, or delayed readback or remarks, significantly prolonging CAS brief significantly and potentially affecting the mission.
1	FAC/Pilot failed to use proper CAS brief & remarks standards and to communicate audibly, severely delaying completion of CAS brief and compromising the mission.

Did closed-loop communication go as expected?	
5	FAC/pilot acknowledged receipt of briefs & remarks, red back required info, verified that sent info was understood as intended, and all relevant team members collaborated effectively to identify options to deal with issues.
4	FAC/pilot acknowledged receipt of brief/remarks, red back required info, verified that sent info was understood as intended, but only some relevant team members collaborated to identify options to deal with issues.
3	FAC/pilot acknowledged receipt of brief & remarks, red back required info, verified that sent info was understood as intended, but failed to collaborate with team members to identify options to deal with issues.
2	FAC/pilot acknowledged receipt of remarks & read back info, failed to verify whether sent info was understood as intended or communicate with other team members to identify options to deal with issues.
1	FAC/pilot failed to acknowledge receipt of remarks & read back info, failed to verify whether sent info was understood as intended or communicate with other team members to identify options to deal with issues.

C.8.2 Coordination

How well were team members' knowledge requirements managed?	
5	FAC/pilot implicitly coordinated in an effective manner (e.g., did not require special coordination or discussion beyond standard turn-taking), and displayed a common understanding of CAS brief SOPs and of the brief/remarks.
4	FAC/pilot coordinated explicitly and effectively (e.g., discussed coordinates formats), and achieved a common understanding of the CAS brief SOPs & brief/remarks with little effort.
3	FAC/pilot made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved common understanding of the SOPs & brief/remarks.
2	FAC/pilot made explicit attempts at coordinating knowledge, and achieved an incomplete common understanding of the SOPs & briefs/remarks.
1	FAC/pilot failed to display a common understanding of the SOPs & brief/remarks.

How effective was back-up behaviour?	
5	Pilot correlated info provided in brief/rks and reported mistakes to FAC as needed; FAC corrected for errors in readback or in own brief as needed; FAC/Pilot prompted each other for next transmission when needed (excluding standard turn taking).
4	Pilot correlated info in brief/rks and reported mistakes as needed; FAC corrected mistakes if they were reported but failed to catch own errors; FAC/Pilot prompted each other for next transmission when needed.
3	Pilot correlated info in brief/rks and reported mistakes as needed, but FAC was unable to correct mistakes; FAC/Pilot prompted each other for next transmission when needed (excluding standard turn taking).
2	Pilot failed to correlated and report errors in info from brief; FAC did not notice and correct own mistakes; FAC/Pilot prompted each other for next transmission when needed.
1	Pilot/FAC failed to notice and correct any errors in the original brief, and failed to prompt each other for next transmission when needed.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.8.3 Cooperation

To what extent were FAC/Pilot working towards the same ends?

5	FAC/Pilot collaborated to ensure CAS brief SOPs (mandatory CAS brief, or that collective SA did not require brief) were adhered to and that all required info was passed & understood for the attack.
4	FAC/Pilot collaborated to understand all relevant CAS brief & remarks info but both had slightly different priorities on brief SOPs, which were easily resolved or accepted.
3	FAC/Pilot collaborated to understand all mandatory CAS brief info, but did not cooperate fully on understanding remarks or had a significant disagreement about brief SOPs; pilot has most but not all info required for talk-on and attack.
2	FAC/Pilot collaborated poorly to achieve joint understanding of brief & remarks, and disagreed significantly about brief SOPs; pilot had only a fraction of the required information for the talk-on and attack.
1	FAC/Pilot could not agree on brief SOPs and did not collaborate to ensure pilot received & understood brief & remarks; pilot did not have any useable information to proceed with talk-on & attack.

How effective were FAC/Pilot as a team?	
5	FAC/Pilot took each other SOPs, brief & remarks info at face value without undue questioning (i.e. questioned only when a clarification was required), and unhesitatingly accepted each other's corrections/clarifications, and trusted each other to have sufficient SA to support SOPs.
4	FAC/Pilot did not question brief/remarks, and accepted corrections easily; but hesitated somewhat before accepting each other's SOPs or that their SA supported SOPs.
3	FAC/Pilot questioned each other's brief SOPs, brief info & remarks, and/or that the other has sufficient SA to support SOPs, delaying brief & remarks without major operational effects.
2	FAC/Pilot extensively questioned each other's SOPs, briefs & remarks & supporting SA, significantly delaying transmission of brief & remarks, potentially affecting the outcome of the mission.
1	FAC/Pilot consistently rejected each other's SOPs, brief & remarks info, and discounted each other's supporting SA.

C.9 Communicate Options with Pilot

C.9.1 Communication

How effective was information exchange?	
5	FAC/pilot communicated options, provided 'big picture' situation updates, included all key info (e.g., how the pilot could address needs, minimize the level of risk to Blue and White forces; determined the best use air assets and appropriate course of action), collectively assessed all options with all relevant team members (FAC, Coy Cdr, FOO, pilot, Higher Cmd) in a timely manner.
4	FAC/pilot communicated options, provided 'big picture' situation updates, included most key info (e.g., how the pilot could address needs, minimize the level of risk to Blue and White forces; to determine the best use air assets and appropriate course of action), collectively assessed most options with only some relevant team members (FAC, Coy Cdr, FOO, pilot, Higher Cmd).

3	FAC/pilot communicated options, provided 'big picture' situation updates, included some key info but had to be asked (e.g., how the pilot could address needs, minimize the level of risk to Blue and White forces), but failed to collaborate with other team members to assess options and develop a suitable course of action.
2	FAC/pilot communicated options but failed to provide 'big picture' situation updates and failed to include key info (e.g., how the pilot could address needs, minimize the level of risk to Blue and White forces).
1	FAC/pilot failed to communicate options.

Was information exchange economical?	
5	FAC/Pilot always used standard brevity & comms procedures, and communicated audibly, requiring no repetition/clarifications.
4	FAC/Pilot occasionally used non-standard terms or comms, or communicated inaudibly, but without prompting repetitions/clarifications.
3	FAC/Pilot used non-standard terms or comms procedures (e.g., didn't wait turn, stepped on other's comms) on occasion, requiring some repetitions/clarifications without significantly delaying communications.
2	FAC/Pilot frequently used non-standard terms or comms procedures, requiring frequent repetitions/clarifications and significantly delaying comms and potentially having a negative impact on task or mission.
1	FAC/Pilot failed to use standard terminology and comms procedures, and did not communicate audibly, rendering comms ineffective (preventing task from being completed).

Did closed-loop communication go as expected?	
5	FAC/pilot acknowledged receipt of options, verified that sent info was understood as intended, and all relevant team members collaborated effectively to build and maintain SA around the most ideal option.
4	FAC/pilot acknowledged receipt of options, verified that sent info was understood as intended, but only some relevant team members collaborated to build and maintain SA around all options.
3	FAC/pilot acknowledged receipt of options, verified that sent info was understood as intended, but failed to collaborate with team members to build and maintain SA.
2	FAC/pilot acknowledged receipt of options, failed to verify whether sent info was understood as intended or communicate with other team members to build and maintain SA.
1	FAC/pilot failed to acknowledge receipt of options, failed to verify whether sent info was understood as intended or communicate with other team members to build and maintain SA.

C.9.2 Coordination

How well were team members' knowledge requirements managed?	
5	FAC/pilot implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a common understanding of the options.
4	FAC/pilot coordinated explicitly and effectively, and achieved common understanding of the options with little effort.
3	FAC/pilot made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved common understanding of the options.
2	FAC/pilot made explicit attempts at coordinating knowledge, and achieved an incomplete common understanding of the options.
1	FAC/pilot failed to display a common understanding of the options.

How adaptable were team members to the changing demands of the situation?	
5	FAC/Pilot reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	FAC/Pilot reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	FAC/Pilot attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	FAC/Pilot were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	FAC/Pilot made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.10 Designate Target

C.10.1 Communication

How effective was information exchange?	
5	FAC passed marking info (target location & description, mark type, mark timing, friendlies in area) to relevant team members (LAV gunner, FOO, FSCC, pilot, etc), discussed options and big picture updates with all team members, and notified pilot of mark (type, location, timing) all in a timely manner.
4	FAC passed required marking info to relevant team members for designation, and notified pilot of mark in timely manner, but discussed marking options and big picture updates with only some team members.
3	FAC omitted some key marking info until prompted by relevant team members, and discussed incomplete marking options and big picture updates with only a few team members, delaying target designation somewhat (not operationally significant); FAC notified pilot of mark in timely manner.

2	FAC passed incomplete marking into to relevant team members and failed to correct omissions/errors; failed to discuss adequately options and big picture updates with team members, significantly delaying mark or resulting in erroneous mark; and/or FAC passed incomplete or late mark information to pilot.
1	FAC failed to pass any useable target designation info to any team members; target was not designated.

Was communication economical?	
5	Team members (FAC, Coy Cdr, FOO, pilot, Higher Cmd, FSCC etc) used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	Team members almost always used standard brevity codes and communications procedures, and communicated audibly, without need to repeat or clarifty.
3	Team members occasionally used non-standard terminology or procedures, and/or occasionally failed communicate audibly, and were sometimes required to repeat or clarify with no adverse impact on designation.
2	Team members failed to always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition, significantly delaying designation and potentially affecting the mission.
1	Team members consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled and compromising target designation.

Did closed-loop communication go as expected?	
5	Team members acknowledged receipt of info, verified that sent info was understood as intended, and all relevant team members collaborated effectively to designate the target.
4	Team members acknowledged receipt of info, verified that sent info was understood as intended, but only some relevant team members collaborated to designate the target.
3	Team members acknowledged receipt of info, verified that sent info was understood as intended, but failed to collaborate with team members to designate the target.
2	Team members acknowledged receipt of info, failed to verify whether sent info was understood as intended or communicate with other team members to designate the target.
1	Team members failed to acknowledge receipt of info.

C.10.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed complete common understanding of each other's TTPs & capabilities relevant to target designation & SA the target context.
4	Team members coordinated explicitly and effectively, and achieved reasonable common understanding of most of each other's TTPs & capabilities relevant to target designation & SA of the target context with little effort.

3	Team members made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved minimally acceptable common understanding of each other's TTPs & capabilities relevant to target designation & SA of the target context.
2	Team members made explicit attempts at coordinating knowledge, but and achieved insufficient common understanding of each other's TTPs & capabilities relevant to target designation & SA of the target context.
1	Team members failed to understand each other's TTPs & capabilities relevant to target designation & SA of the target context.

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources.
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members failed to observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How effective was back-up behaviour?	
5	More than one team member requested/provided assistance as needed [to mark the target] in a timely manner; team members explicitly corrected each other's errors to designate the target, recognised when one performed exceptionally well.
4	More than one team member requested assistance as needed, team members explicitly challenged each other as mistakes were detected but failed to correct them as necessary.
3	Only one team member transmitted a request assistance, team members implicitly corrected each other's errors to designate the target but some errors were missed.
2	Those team members who recognised the need for support failed to request assistance; assumed other team member(s) would request assistance, detected errors made by others but failed correct them.
1	Team members failed to recognise the need to request assistance, failed to detect/correct other's errors.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.10.3 Cooperation

To what extent were team members working toward the same ends?	
5	Team members (FAC, FSCC, FOO, LAV gunner, UAV etc) all made marking the target their top priority: relevant team members diverted resources from ongoing ops to mark target or exchange information to facilitate marking.
4	Team members supported the target marking task but some placed its priority slightly lower, somewhat delaying target marking or passing of crucial information; target designation somewhat delayed (without operational consequences).
3	Team members disagree with FAC on priority of target marking and significantly delay target mark or exchange of crucial info; pilot receives target mark notification late, with potential negative impacts on CAS mission.
2	Severe disagreements between FAC & other team members about priority of target marking delay target designation to the point that pilot fails to receive mark notification in a timely manner, severely compromising CAS mission.
1	Team members fail completely to agree on priority of target marking; target is never designated.

How effective were FAC/others as a team?	
5	FAC trusts all team mates and shows no signs of hesitating to select optimal mark type for the situation based on doubts of team members' abilities (including self); neither FAC not pilot request more marks than is operationally necessary.
4	FAC has some doubts about some team mates and hesitates to select optimal mark type for the situation; neither FAC not pilot request more marks than is operationally necessary.
3	FAC selects suboptimal mark type for situation for no objective reason (has doubts about team members' abilities, including self); and/or FAC/Pilot request more marks than operationally necessary due to doubts over other's marking/target descriptions.
2	FAC insists on marking target himself even though others are better placed to do so, due to lack of confidence in them; and FAC/Pilot request more marks than operationally necessary due to doubts over other's marking/target descriptions.
1	FAC mistrust self or others' ability to mark to the point that he refuses to designate or request mark; and/or pilot insists on self- or buddy-lasing with no coordination from FAC.

To what extent did team members exhibit mutual trust?	
5	Team members (FAC, FOO, pilot, predator operator, LAV gunner) were always available when needed, exhibited full confidence in each other's skills to get this task done (to maintain laser contact on target; to deliver/receive an effective talk-on from smoke-/illumination-/fires-to target), depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members (FAC, FOO, pilot, predator operator, LAV gunner) were usually available when needed, were confident in each other's skills to get this task done (to maintain laser contact on target; to deliver/receive an effective talk-on from smoke-/illumination-/fires-to target), followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info freely.
3	Team members (FAC, FOO, pilot, predator operator, LAV gunner) attempted to make themselves available when needed, challenged each other as required, were confident in each other's skills to get this task done (to maintain laser contact on target; to deliver/receive an effective talk-on from smoke-/illumination-/fires-to target) but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties.
2	Team members (FAC, FOO, pilot, predator operator, LAV gunner) were indifferent to each other's needs, were not confident in each other's skills to get this task done (to maintain laser contact on target; to deliver/receive an effective talk-on from smoke-/illumination-/fires-to target), were confrontational and antagonistic, broke promises, and resisted to share info freely.
1	Team members (FAC, FOO, pilot, predator operator, LAV gunner) were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done (to maintain laser contact on target; to deliver/receive an effective talk-on from smoke-/illumination-/fires-to target), always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.11 Coordinate with FOO

C.11.1 Communication

How effective was information exchange?	
5	FAC/FOO communicated with all available resources about all key info (e.g. to mark by fire, to use particular sensors, to build SA), and 'big picture' situation updates in a timely manner.
4	FAC/FOO communicated with all available resources about key info in a timely manner but did not communicate about big picture updates.
3	FAC/FOO sought relevant key info from available resources reactively (after it became clear he did not have it).
2	FAC/FOO sought only some info, or failed to consult some key resources.
1	FAC/FOO did not seek any info from any resources.

Was communication economical?	
5	FAC & FOO communicated in a clearly audible way, using standard brevity codes; in a timely manner.
4	FAC & FOO usually communicated with pilot or other team members in an audible way (occasionally garbled) using standard brevity (non-standard terms were occasionally used);
3	FAC & FOO members often used non-standard terms or communicated in an inaudible way, requiring frequent repetitions/clarifications;
2	FAC & FOO consistently used non-standard terms or communicated in an inaudible way, spent more time repeating & clarifying than communicating; frequently stepped on each other's comm.
1	FAC & FOO failed to communicate audibly or concisely; failed to coordinate the use of shared resources effectively.

Did closed-looped communication go as expected?	
5	FAC/FOO acknowledged receipt of info, verified that sent info was understood as intended, and all relevant team members collaborated effectively.
4	FAC/FOO acknowledged receipt of info, verified that sent info was understood as intended, but only some relevant team members collaborated.
3	FAC/FOO acknowledged receipt of info, verified that sent info was understood as intended, but failed to collaborate with team members.
2	FAC/FOO acknowledged receipt of info, failed to verify whether sent info was understood as intended or communicate with other team members.
1	FAC/FOO failed to acknowledge receipt of info.

C.11.2 Coordination

How well were team members' knowledge requirements managed?	
5	FAC/FOO implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed complete common understanding of each other's TTPs & capabilities.
4	FAC/FOO coordinated explicitly and effectively, and achieved reasonable common understanding of most of each other's TTPs & capabilities.
3	FAC/FOO made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved minimally acceptable common understanding of each other's TTPs & capabilities.
2	FAC/FOO made explicit attempts at coordinating knowledge, but and achieved insufficient common understanding of each other's TTPs & capabilities.
1	FAC/FOO failed to understand each other's TTPs & capabilities.

How adaptable were team members to the changing demands of the situation?	
5	FAC/FOO reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	FAC/FOO reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	FAC/FOO attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	FAC/FOO were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	FAC/FOO made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.11.3 Cooperation

To what extent were team members working toward the same ends?	
5	FAC/FOO both made coordinating their efforts a top priority: they diverted resources from ongoing ops (e.g. to mark target or exchange information to facilitate marking).
4	FAC/FOO coordinated their efforts but some placed its priority slightly lower, somewhat delaying ongoing ops (e.g. target marking or passing of crucial information; target designation somewhat delayed (without operational consequences)).
3	FAC/FOO disagree with each other on the priority to coordinate their efforts, e.g. resource competition results in significant delay of target mark or exchange of crucial info; pilot receives target mark notification late, with potential negative impacts on CAS mission.
2	Severe disagreements between FAC/FOO about priority of coordinating their efforts, e.g. pilot fails to receive key info from FAC (e.g. re. mark notification) in a timely manner, severely compromising CAS mission.
1	FAC/FOO fail completely to coordinate their efforts around the collective goals of the group (e.g. to designate the target) ahead of individual goals.

How effective were the FAC/others as a team?	
5	FAC/FOO trusted each other and showed no signs of hesitating to accommodate each other as needed, did not doubt each other's abilities (including self); neither FAC nor FOO requested more info than necessary.
4	FAC/FOO has some doubts about the other and hesitated to accommodate the others duties for the situation; neither FAC nor FOO requested more info than necessary.
3	FAC/FOO had doubts about the other's abilities; and/or FAC/FOO requested more info (e.g. status and scheme of manoeuvre) than operationally necessary.
2	FAC insists on marking doing things individually even though others are better placed to do so, due to lack of confidence in them; and FAC/FOO request more info than operationally necessary due to doubts over other's abilities.
1	FAC/FOO fail to coordinate their efforts for the purpose of team objectives.

To what extent did team members display mutual trust?	
5	Team members were always available when needed, exhibited full confidence in each other's skills to get this task done, depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members were usually available when needed, were confident in each other's skills to get this task done, followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info freely.
3	Team members attempted to make themselves available when needed, challenged each other as required, were confident in each other's skills to get this task done but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties.
2	Team members were indifferent to each other's needs, were not confident in each other's skills to get this task done, were confrontational and antagonistic, broke promises, and resisted to share info freely.
1	Team members were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done, always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.12 Transmit Talk-on

C.12.1 Communication

How effective was information exchange?	
5	FAC performed a successful and effective talk on, provided 'big picture' situation updates, included all key info (e.g., reference point to target, unit of measure, direction, distance, object, target id, target confirmation, questions about target area, talk on onto blue/white positions, and attack heading), and effectively coordinated knowledge requirements with all relevant team members in a timely manner.
4	FAC performed a successful and effective talk on, provided 'big picture' situation updates, included most key info, coordinated knowledge requirements with only some relevant team members.
3	FAC performed a successful talk on, provided 'big picture' situation updates, failed to provide some key info, FAC/pilot asked for key info, FAC/pilot coordinated knowledge requirements for key info with other team members.
2	FAC performed a successful talk on but failed to provide 'big picture' situation updates and failed to include key info (e.g. locations of red/white/blue forces).
1	FAC failed to perform a successful talk on.

Was communication economical?	
5	FAC/pilot used standard brevity codes and communications procedures, and communicated audibly (ungarbled); there was no need for anyone to repeat information or to clarify utterances.
4	FAC/pilot used standard brevity codes and communications procedures, and communicated audibly, but there were a few requests to clarify utterances.
3	FAC/pilot used standard brevity codes and communications procedures, but failed to always communicate audibly and were required to repeat or clarify sometimes.
2	FAC/pilot failed to always use standard brevity codes and communications procedures, and/or communicated inaudibly often and required frequent repetition.
1	FAC/pilot consistently failed to use standard brevity codes and communications procedures, and/or consistently communicated inaudibly, failing to repeat utterances that were garbled.

Did closed-loop communication go as expected?	
5	FAC/pilot acknowledged receipt of info, verified that sent info (e.g., FAC-to-pilot: contact reference point, target identified, and location of friendlies) was understood as intended, and all relevant team members collaborated effectively to build and maintain SA of the target area.
4	FAC/pilot acknowledged receipt of info, verified that sent info was understood as intended, but only some relevant team members collaborated to build and maintain SA of the target area.
3	FAC/pilot acknowledged receipt of info, verified that sent info was understood as intended, but failed to collaborate with team members to build and maintain SA of the target area.
2	FAC/pilot acknowledged receipt of info, failed to verify whether sent info was understood as intended or communicate with other team members to build and maintain SA of the target area.
1	FAC/pilot failed to acknowledge receipt of info, failed to verify whether sent info was understood as intended or communicate with other team members to build and maintain SA of the target area.

C.12.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a common understanding to build SA of the target area. [during the talk on]
4	Team members coordinated implicitly and effectively, but still failed to achieve a common understanding to build SA of the target area.
3	Team members made explicit attempts at coordinating knowledge (e.g., asked each other questions), and at great effort (e.g., much time spent in discussion) achieved common understanding to build SA of the target area.
2	Team members made explicit attempts at coordinating knowledge, and achieved an incomplete common understanding to build SA of the target area.
1	Team members failed to display a common understanding to build SA of the target area.

How well did the team members monitor each other's performance?	
5	Team members observed the behaviours and actions of other team members (e.g., FAC observed pilot's performance re: contact reference point, routing as expected, identified target, located friendlies, following attack heading; Pilot observed behaviours of Blue/White forces), detected when others made errors, and were aware of their own surroundings as well as other's; team members proactively sought info about and detected key changes in team status or mission resources. [during the talk-on]
4	They observed the behaviours and actions of other team members, detected when others made errors, and were aware of their own surroundings as well as other's; team members failed to detect some key changes in team status or mission resources despite proactively seeking the info.
3	They observed the behaviours and actions of other team members, and detected when others made errors; but they failed to detect changes in team status or mission resources.
2	They observed the behaviours and actions of other team members; but failed to detect when others made error, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.
1	Team members failed to observe the behaviours and actions of other team members, failed to detect when others made errors while building SA, were not aware of their own and other's surroundings, and failed to detect changes in team status or mission resources.

How effective was back-up behaviour?	
5	FAC/pilot requested/provided assistance as needed in a timely manner; explicitly corrected each other's errors, recognised when one performed exceptionally well.
4	FAC/pilot requested assistance as needed, explicitly challenged each other as mistakes were detected (e.g. FAC challenged pilot when s/he routed incorrectly or mistook red/white/blue locations) but failed to correct them as necessary.
3	FAC/pilot requested assistance but hesitated to do so, team members implicitly corrected each other's errors during the talk on but some errors were missed.
2	FAC/pilot recognised the need for support but failed to request assistance or chose to meet the need solo, detected errors made by the other (FAC/pilot) but failed to correct them.
1	Team members failed to recognise the need to request assistance, failed to detect/correct other's errors.

How adaptable were team members to the changing demands of the situation?	
5	Team members reallocated workload dynamically and/or compensated for others implicitly. Task was executed successfully despite increased complexity.
4	Team members reallocated work and/or compensated for others following explicit requests or negotiation; task was executed successfully but with more effort than needed.
3	Team members attempted to reallocate work and/or compensate for others to some degree, and the task was completed but with significantly degraded performance.
2	Team members were unable to reallocate work and/or compensate for others despite attempts, and failed to complete the task successfully.
1	Team members made no attempt to reallocate work and/or compensate for others; increased complexity of the situation led to task failure.

C.12.3 Cooperation

To what extent were FAC/Pilot working towards the same ends?	
5	FAC/Pilot collaborated to ensure both had the same SA on the target area (positive ID of target, blue & white forces confirmed) and that pilot arrived at target on time and at the right attack angle.
4	FAC/Pilot collaborated to ensure both has same SA on target and that pilot arrived at target on time and at the right attack angle, but made fewer efforts to confirm joint SA of blue & white forces
3	FAC/Pilot collaborated to ensure both had same SA on target but did not achieve joint SA on Pilot's attack angle, and did not cross-confirm each other's SA of blue or white forces.
2	FAC/Pilot confirmed a shared visual description of target but proceeded with respective tasks without confirming joint SA on target context (target location, blue & white situation in target area); FAC cleared pilot without confirming both shared SA of pilot's attack angle.
1	FAC/Pilot proceeded with respective tasks without achieving joint SA on target, blue, while situations and pilot's attack angle.

How effective were FAC/Pilot as a team?	
5	FAC/Pilot took each other descriptions & positive IDs at face value, without undue questioning (i.e. questioned only when a clarification was required); unhesitatingly accepted each other's corrections or additional SA information which could not be independently verified (e.g., FAC accepted correction to target location from pilot when pilot had a better view of target than FAC).
4	FAC/Pilot did not question descriptions & IDs more than necessary, and accepted corrections easily; but hesitated somewhat before accepting SA from other that could not be independently confirmed.
3	FAC/Pilot questioned each other's descriptions & IDs a bit more than necessary before accepting them, and displayed some hesitation in accepting corrections; they expressed strong doubts about SA provided by other that they could not independently confirm.
2	Accepted other's descriptions and positive IDs only after lengthy & detailed questioning; expressed strong doubts about SA provided by other that they could not independently
1	Consistently questioned & doubted each other's descriptions & IDs; did not accept corrections; did not act on extra info; maintained that own SA was correct and that other's was wrong

To what extent did team members exhibit mutual trust?	
5	Team members (FAC/pilot) were always available when needed, exhibited full confidence in each other's skills to get this task done, depended on each other to complete this task without having to micro-manage expectations, did things competently and consistently from one time to the next, followed each other blindly, readily took ideas, talked freely about difficulties, negotiated joint expectations fairly, challenged each other effectively, displayed absolute integrity, lived up to promises, were honourable during tough times, exhibited strong ethics, anticipated each other's actions, didn't do anything to make each other look bad, and failed to mislead each other.
4	Team members (FAC/pilot) were usually available when needed, were confident in each other's skills to get this task done, followed each other blindly, assessed ideas before taking them, challenged each other as required, and exchanged info (re. reference point to target, unit of measure, direction, distance, object, target id, target confirmation, questions about target area, talk on onto friendly positions, and attack heading) freely.

3	Team members (FAC/pilot) attempted to make themselves available when needed, challenged each other as required, were confident in each other's skills to get this task done but displayed a tendency to micro-manage expectations, assessed ideas before taking them, and talked cautiously about difficulties (re. reference point to target, unit of measure, direction, distance, object, target id, target confirmation, questions about target area, talk on onto friendly positions, and attack heading).
2	Team members (FAC/pilot) were indifferent to each other's needs, were not confident in each other's skills to get this task done, were confrontational and antagonistic, broke promises, and resisted to share info (re. reference point to target, unit of measure, direction, distance, object, target id, target confirmation, questions about target area, talk on onto friendly positions, and attack heading) freely.
1	Team members (FAC/pilot) were indifferent to each other's needs, failed to challenge each other as required, were not confident in each other's skills to get this task done, always micro-managed expectations, resisted taking each other's ideas, failed to follow each other blindly, were confrontational and antagonistic, attempted to make each other look bad, never knew what other team members were likely to do, misled each other, always broke promises, never put words into actions, in difficult situations team members were just out for themselves and failed to protect each other, and always tried to get the upper hand.

C.13 Perform BDA

C.13.1 Communication

How effective was information exchange?	
5	FAC/pilot sought BDA from each other and all available resources, collectively assessed BDA with relevant team members, and communicated all key BDA info (e.g., time ordnance went off, flight, ordnance used, position, results of weapons release) to all C2 organisations, provided 'big picture' situation updates, all in a timely manner.
4	FAC/pilot sought updates from available resources about key info in a timely manner but did not seek a big picture update.
3	FAC/pilot sought relevant key info from available resources reactively (after it became clear he did not have it).
2	FAC/pilot sought only some info, or failed to consult some key resources.
1	FAC/pilot did not seek any info from any sources.

C.13.2 Coordination

How well were team members' knowledge requirements managed?	
5	Team members implicitly coordinated in an effective manner (e.g., they seemed to know what others understood or needed without asking), and displayed a common understanding of the CAS mission, commander's intent, team, and resources available to them.
4	Team members coordinated explicitly and effectively, and achieved a common understanding of one of the following: CAS mission, commander's intent, team, and resources available to them with little effort.
3	Team members made explicit attempts at coordinating knowledge, and at great effort (e.g., much time spent in discussion) achieved common understanding of most of the following: CAS mission, commander's intent, team, and resources available to them.

2	Team members made explicit attempts at coordinating knowledge (e.g., asked each other questions), and achieved an incomplete common understanding of the CAS mission, commander's intent, team, and resources available to them.
1	Team members did not display a common understanding of the CAS mission, higher commander's intent, task, team, and resources available to them

C.14 Abort CAS Mission

C.14.1 Communication

How effective was information exchange?	
5	FAC/Pilot communicated all information potentially requiring abort (e.g. incursion of Blue forces into target area) in a timely manner; FAC monitored communications with pilot for indications of lack of SA (e.g. pilot doesn't report attack heading); FAC transmitted abort call to pilot in timely manner.
4	FAC/Pilot communicated most key information potentially requiring abort in a timely manner; FAC monitored communications with pilot for indications of lack of SA; FAC transmitted abort call to pilot in timely manner.
3	FAC/Pilot were only partially effective in communicating about information requiring abort in timely manner (were not always timely, or sometimes failed to pass or seek information); FAC monitored communications with pilot for indications of lack of SA; FAC transmitted abort call to pilot in timely manner.
2	FAC/Pilot were ineffective in communicating about information requiring abort in timely manner (generally not timely, or failed to pass or seek information); FAC did not adequately monitor communications with pilot for indications of lack of SA; FAC failed to transmit abort call.
1	FAC/Pilot failed to communicate in a timely manner about big picture and detailed information that would require mission abort; FAC failed to note errors in pilot SA requiring mission abort; FAC failed to transmit abort call in timely manner.

Was communication economical?	
5	FAC & pilot communicated in a clearly audible way, using standard brevity codes; FAC used proper abort code.
4	FAC & pilot usually communicated with pilot or other team members in an audible way (occasionally garbled) using standard brevity (non-standard terms were occasionally used); FAC used proper abort code.
3	FAC & pilot members often used non-standard terms or communicated in an inaudible way, requiring frequent repetitions/clarifications; FAC used proper abort code.
2	FAC &pilot consistently used non-standard terms or communicated in an inaudible way, spent more time repeating & clarifying than communicating; FAC failed to use proper abort code.
1	FAC & pilot failed to communicate audibly or concisely; FAC failed to use proper abort code.

C.14.2 Coordination

How well were team members' knowledge requirements managed?	
5	FAC/Pilot implicitly shared common expectations about abort conditions (e.g., SA requirements within control type parameters; final attack procedures; ordnance and danger close); FAC/Pilot communicated information potentially requiring mission without being asked.
4	FAC/Pilot explicitly established common expectations about abort conditions with little effort; FAC/Pilot communicated information potentially requiring mission without being asked.
3	FAC/Pilot shared only some expectations about abort conditions; FAC/Pilot had to ask each other for information potentially requiring mission abort.
2	FAC/Pilot had independent expectations about abort conditions; FAC/Pilot had to ask each other for information potentially requiring mission abort.
1	FAC/Pilot had independent expectations about abort conditions; FAC/Pilot did not communicate information potentially requiring mission abort.

How well did the team members monitor each other's performance?	
5	FAC/Pilot were implicitly aware of conditions in each other's surroundings & SA requiring abort (shared this without prompting); FAC monitored pilot's compliance with abort directive.
4	FAC/Pilot required explicit coordination to monitor each other's surroundings or SA regarding abort conditions; FAC monitored pilot's compliance with abort directive.
3	FAC/Pilot were aware of each other's surroundings or SA regarding abort conditions but did not share this information on this (e.g. FAC saw but failed to report Blue incursion into target area); FAC monitored pilot's compliance with abort directive.
2	FAC or pilot lacked awareness of each other's surroundings or SA regarding abort conditions; FAC monitored pilot's compliance with abort directive.
1	FAC and pilot failed to establish awareness of each other's surroundings or SA regarding abort conditions; FAC failed to monitor pilot's compliance with abort directive.

C.14.3 Cooperation

To what extent did team members display mutual trust?	
5	FAC aborted call based on objective conditions (not on perception of pilot incompetence, or due to pilot's expressed unease with FAC SA); Pilot accepts and complies with abort directive without hesitating.
4	FAC expresses minor doubts or Pilot expresses unease, abort based mostly on objective conditions; pilot accepts & complies with abort directive.
3	FAC aborts call based on expressed doubts about pilot SA (SA proves to be correct) or pilot's unease about talk-on etc; Pilot accepts & complies with abort directive.
2	FAC aborts call based on expressed doubts about pilot SA (SA proves to be correct) or pilot's unease; Pilot registers objection to but complies with abort directive.
1	FAC expresses doubts about pilot's SA, and pilot expresses unease with FAC's talk-on or designation; Pilot objects to abort directive strenuously (complies or not?)

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Annex D – BARS Applied at Exercise Northern Goshawk

BARS Groups

Prior to the exercise, the SA grouped BARS according to their relevance to different stages of anticipated CAS missions. This organisation is presented below:

1. Pre-check-in
    1.1. Understand situation (Blue, Red, White, Brown)
    1.2. Transmit immediate CAS request [if applicable]
2. Check-in
    2.1. Receive pilot's scheduled check-in
3. NTISR/Pre-planned CAS with no target [if applicable]
    3.1. Communicate options with pilot
    3.2. Understand situation (Blue, Red, White, Brown)
4. CAS mission
    4.1. Transmit CA Brief and Communicate Remarks
    4.2. Transmit talk-on
    4.3. Deconflict target area
    4.4. Designate target
    4.5. Abort mission [if applicable]
5. End/re-task
    5.1. Perform BDA
    5.2. Communicate options with pilot
    5.3. Understand situation (Blue, Red, White, Brown)

Data Collected

The following represents data collected by both raters for each day of the exercise excluding August 6, 2007.

Multiple sets of BARS were collected. The general convention followed was to bind each set of ratings first by mission objectives. Then, it made sense to have two different sets of ratings so long as it reflected tasks that team members followed to achieve independent mission objectives. Therefore, one rating resulted from a mission objective involving multiple team members, e.g. to perform MEDEVAC, whereby the FAC worked with the ASOC, the convoy commander, and the MEDEVAC chopper whereas another set of ratings resulted from a mission objective re ISR.

August 07, 2007 (Tuesday)

Rater 1

Note: In retrospect, rater 1 combined the Situation Updates into 1 rating instead of 4 ratings regarding (Blue, Red, White and Brown).

Set A: Archer mission; Players are FAC, Coy Cdr, Archer10 (Blackjack?)

Set B: Skull Mission; Players are FAC, Coy Cdr, Skull, Blackjack.

BARS		Multiple Ratings	
		Set A	Set B
1.1	Understand situation updates		
	Communication		
	How effective was information exchange?	5	
	Was communication economical?	5	
	Did closed looped communication go as expected?	5	
	Coordination		
	How well were team members' knowledge requirements managed?	4	
	How well did the team members monitor each other's performance?	NR	
	How adaptable were team members to the changing demands of the situation?	NR	
	Cooperation		
	To what extent were team members working toward the same ends?	5	
	How effective were FAC/others as a team?	5	
1.2	Transmit immediate CAS request		
	Communication		
	How effective was information exchange?	NR	
	Was communication economical?	NR	
	Did closed looped communication go as expected?	NR	
	Coordination		
	How well were team members' knowledge requirements managed?	NR	
	How effective was back-up behaviour?	NR	
	Cooperation		
	To what extent were team members working toward the same ends?	NR	
	How effective were FAC/others as a team?	NR	
2.1	Receive pilot's scheduled check-in		

BARS		Multiple Ratings	
		Set A	Set B
	Communication		
	How effective was information exchange?	5	4
	Was communication economical?	4	5
	Did closed looped communication go as expected?	4	5
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
	How well did team members monitor each other's performance?	NR	NR
	How adaptable were team members to the changing demands of the situation?	NR	NR
3.1	Communicate options with pilot		
	Communication		
	How effective was information exchange?	NR	4
	Was information economical?	NR	3
	Did closed looped communication go as expected?	NR	5
	Coordination		
	How well were team members' knowledge requirements managed?	NR	3
	How adaptable were team members to the changing demands of the situation?	NR	4
3.2	Understand situation updates		
	Communication		
	How effective was information exchange?	NR	3
	Was information exchange economical?	NR	5
	Did closed looped communication go as expected?	NR	5
	Coordination		
	How well were team members' knowledge requirements managed?	NR	4
	How well did team members monitor each other's performance?	NR	5
	How adaptable were team members to the changing demands of the situation?	NR	4
	Cooperation		
	To what extent were team members working toward the same ends?	4	5
	How effective were FAC/others as a team?	NR	5
4.1	Transmit CAS brief and communicate remarks		
	Communication		
	How effective was information exchange?	NR	3

BARS		Multiple Ratings	
		Set A	Set B
	Was communication economical?	NR	3
	Did closed looped communication go as expected?	NR	5
	Coordination		
	How well were team members' knowledge requirements managed?	NR	4
	How effective was back-up behaviour?	NR	5
	How adaptable were team members to the changing demands of the situation?	NR	5
4.2	Transmit talk-on		
	Communication		
	How effective was information exchange?	NR	5
	Was communication economical?	NR	5
	Did closed looped communication go as expected?	NR	NR
	Coordination		
	How well were team members' knowledge requirements managed?		NR
	How well did team members monitor each other's performance?		NR
	How effective was back-up behaviour?		NR
	How adaptable were team members to the changing demands of the situation?		NR
	Cooperation		
	To what extent were team members working toward the same ends?		NR
	How effective were FAC/others as a team?		NR
4.3	Deconflict target area		
	Communication		
	How effective was information exchange?	3	3
	Was communication economical?	4	4
	Did closed looped communication go as expected?	5	5
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
	How well did team members monitor each other's performance?	5	5
	How effective was back-up behaviour?	5	5
	How adaptable were team members to the changing demands of the situation?	4	4
	Cooperation		
	To what extent were team members working toward the same ends?	5	5

BARS		Multiple Ratings	
		Set A	Set B
	How effective were FAC/others as a team?	5	5
4.4	Designate target		
	Communication		
	How effective was information exchange?	1	4
	Was communication economical?	1	3
	Did closed looped communication go as expected?	1	5
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
	How well did team members monitor each other's performance?	1	5
	How effective was back-up behaviour?	NR	NR
	How adaptable were team members to the changing demands of the situation?	NR	NR
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?	NR	NR
4.5	Abort mission	NR	NR
	Communication		
	How effective was information exchange?	NR	NR
	Was communication economical?	NR	NR
	Cooperation		
	To what extent did team members display mutual trust?	NR	NR
5.1	Perform BDA		
	Communication		
	How effective was information exchange?	5	5
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
5.2	Communicate options with pilot		
	Communication		
	How effective was information exchange?	5	5
	Was information economical?	NR	3
	Did closed looped communication go as expected?	5	5
	Coordination		

BARS		Multiple Ratings	
		Set A	Set B
	How well were team members' knowledge requirements managed?	4	4
	How adaptable were team members to the changing demands of the situation?	5	5
5.3	Situation updates		
	Communication		
	How effective was information exchange?	5	5
	Was communication economical?	4	3
	Did closed looped communication go as expected?	5	5
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
	How well did team members monitor each other's performance?	5	5
	How adaptable were team members to the changing demands of the situation?	5	5
	Cooperation		
	To what extent were team members working toward the same ends?	5	5
	How effective were FAC/others as a team?	5	5

Rater 2

BARS Groups		Ratings
1.1	Understand situation (Blue, Red, White, Brown)	
	Communication	
	How effective was information exchange?	B4; R4
	Was communication economical?	B4;
	Did closed looped communication go as expected?	B5;
	Coordination	
	How well were team members' knowledge requirements managed?	B5;
	How well did the team members monitor each other's performance?	B4;
	How adaptable were team members to the changing demands of the situation?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	
1.2	Transmit immediate CAS request	
	Communication	

BARS Groups		Ratings
	How effective was information exchange?	
	Was communication economical?	
	Did closed looped communication go as expected?	
	Coordination	
	How well were team members' knowledge requirements managed?	
	How effective was back-up behaviour?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	
2.1	Receive pilot's scheduled check-in	
	Communication	
	How effective was information exchange?	4
	Was communication economical?	4
	Did closed looped communication go as expected?	4
	Coordination	
	How well were team members' knowledge requirements managed?	4
	How well did team members monitor each other's performance?	
	How adaptable were team members to the changing demands of the situation?	
3.1	Communicate options with pilot	
	Communication	
	How effective was information exchange?	4
	Was information exchange economical?	
	Did closed looped communication go as expected?	
	Coordination	
	How well were team members' knowledge requirements managed?	
	How adaptable were team members to the changing demands of the situation?	
3.2	Understand situation (Blue, White, Red, Brown)	
	Communication	
	How effective was information exchange?	B3; R3
	Was communication economical?	B4; R4
	Did closed looped communication go as expected?	B4; R4
	Coordination	
	How well were team members' knowledge requirements managed?	B4; R4

BARS Groups		Ratings
	How well did team members monitor each other's performance?	
	How adaptable were team members to the changing demands of the situation?	B5; R5
	Cooperation	
	To what extent were team members working toward the same ends?	R4
	How effective were FAC/others as a team?	
4.1	Transmit CAS brief and communicate remarks	
	Communication	
	How effective was information exchange?	4
	Was communication economical?	
	Did closed looped communication go as expected?	
	Coordination	
	How well were team members' knowledge requirements managed?	
	How effective was back-up behaviour?	4
	How adaptable were team members to the changing demands of the situation?	
4.2	Transmit talk-on	
	Communication	
	How effective was information exchange?	4
	Was communication economical?	
	Did closed looped communication go as expected?	4
	Coordination	
	How well were team members' knowledge requirements managed?	5
	How well did team members monitor each other's performance?	4
	How effective was back-up behaviour?	
	How adaptable were team members to the changing demands of the situation?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	4
4.3	Deconflict target area	
	Communication	
	How effective was information exchange?	5
	Was communication economical?	
	Did closed looped communication go as expected?	3
	Coordination	

BARS Groups		Ratings
	How well were team members' knowledge requirements managed?	
	How well did team members monitor each other's performance?	
	How effective was back-up behaviour?	
	How adaptable were team members to the changing demands of the situation?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	
4.4	Designate target	
	Communication	
	How effective was information exchange?	
	Was communication economical?	
	Did closed looped communication go as expected?	
	Coordination	
	How well were team members' knowledge requirements managed?	
	How well did team members monitor each other's performance?	
	How effective was back-up behaviour?	
	How adaptable were team members to the changing demands of the situation?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	
4.5	Abort mission	
	Communication	
	How effective was information exchange?	
	Was communication economical?	
	Cooperation	
	To what extent did team members display mutual trust?	
5.1	Perform BDA	
	Communication	
	How effective was information exchange?	5
	Coordination	
	How well were team members' knowledge requirements managed?	5
5.2	Communicate options with pilot	
	Communication	

BARS Groups		Ratings
	How effective was information exchange?	5
	Did closed looped communication go as expected?	4
	Coordination	
	How well were team members' knowledge requirements managed?	3
	How adaptable were team members to the changing demands of the situation?	
5.3	Understand situation (Blue, Red, White, Brown)	
	Communication	
	How effective was information exchange?	B4; R5
	Was communication economical?	B5; R5
	Did closed looped communication go as expected?	B5; R5
	Coordination	
	How well were team members' knowledge requirements managed?	B4; R4
	How well did team members monitor each other's performance?	
	How adaptable were team members to the changing demands of the situation?	
	Cooperation	
	To what extent were team members working toward the same ends?	
	How effective were FAC/others as a team?	

August 08, 2007 (Wednesday)

Rater 1

Set A: ISR. Players are FAC, Coy Cdr, ASOC, and Archer.

Set B: TIC. Players are Archer, FAC, Coy Cdr, and ASOC.

Set C: TIC: Machines-1.

Set D: TIC: Machines-2.

Set E: Skull.

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
1.1	Understand situation updates					
	Communication					
	How effective was information exchange?	5				
	Was communication economical?	4				

	BARS	Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	Did closed looped communication go as expected?	5				
	Coordination					
	How well were team members' knowledge requirements managed?	4				
	How well did the team members monitor each other's performance?	5				
	How adaptable were team members to the changing demands of the situation?	NR				
	Cooperation					
	To what extent were team members working toward the same ends?	5				
	How effective were FAC/others as a team?					
1.2	Transmit immediate CAS request					
	Communication					
	How effective was information exchange?		4			
	Was communication economical?		3			
	Did closed looped communication go as expected?		5			
	Coordination					
	How well were team members' knowledge requirements managed?		4			
	How effective was back-up behaviour?		4			
	Cooperation					
	To what extent were team members working toward the same ends?		5			
	How effective were FAC/others as a team?		NR			
2.1	Receive pilot's scheduled check-in					
	Communication					
	How effective was information exchange?	3	5	4		4
	Was communication economical?	3	5	4		4
	Did closed looped communication go as expected?	4	5	5		4
	Coordination					
	How well were team members' knowledge requirements managed?	4	4	4		4
	How well did team members monitor each other's performance?	5	5	5		5
	How adaptable were team members to the changing demands of the situation?	NR	NR	NR		NR
3.1	Communicate options with pilot					
	Communication					
	How effective was information exchange?	5	NR	NR		NR

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	Was information exchange economical?	3	NR	NR		NR
	Did closed looped communication go as expected?	5	NR	NR		NR
	Coordination					
	How well were team members' knowledge requirements managed?	4		3		
	How adaptable were team members to the changing demands of the situation?	3		3		
3.2	Understand situation updates					
	Communication					
	How effective was information exchange?	3				
	Was communication economical?	3				
	Did closed looped communication go as expected?	5				
	Coordination					
	How well were team members' knowledge requirements managed?	4		4		
	How well did team members monitor each other's performance?	4		4		
	How adaptable were team members to the changing demands of the situation?	4		4		
	Cooperation					
	To what extent were team members working toward the same ends?	5				
	How effective were FAC/others as a team?	5				
4.1	Transmit CAS brief and communicate remarks					
	Communication					
	How effective was information exchange?		5	5	5	
	Was communication economical?		3	3	2	
	Did closed looped communication go as expected?		5	5	5	
	Coordination					
	How well were team members' knowledge requirements managed?		5	5	5	
	How effective was back-up behaviour?		5	5	4	
	How adaptable were team members to the changing demands of the situation?		3	4		
	Cooperation					
	To what extent were team members working toward the same ends?		5			
	How effective were FAC/others as a team?		5			
4.2	Transmit talk-on					
	Communication					

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	How effective was information exchange?		3	5		5
	Was communication economical?		5	3		3
	Did closed looped communication go as expected?		5	4		5
	Coordination					
	How well were team members' knowledge requirements managed?		4	3		4
	How well did team members monitor each other's performance?		3	4		4
	How effective was back-up behaviour?		4	5		5
	How adaptable were team members to the changing demands of the situation?		4	4		4
	Cooperation					
	To what extent were team members working toward the same ends?		5	5		5
	How effective were FAC/others as a team?		5	5		5
4.3	Deconflict target area					
	Communication					
	How effective was information exchange?		2	5		
	Was communication economical?		5	5		
	Did closed looped communication go as expected?		5	5		
	Coordination					
	How well were team members' knowledge requirements managed?		3	NR		
	How well did team members monitor each other's performance?		4	NR		
	How effective was back-up behaviour?		4	NR		
	How adaptable were team members to the changing demands of the situation?		4	NR		
	Cooperation					
	To what extent were team members working toward the same ends?		5			
	How effective were FAC/others as a team?		5			
4.4	Designate target					
	Communication					
	How effective was information exchange?					
	Was communication economical?					
	Did closed looped communication go as expected?					
	Coordination					
	How well were team members' knowledge requirements managed?					

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	How well did team members monitor each other's performance?					
	How effective was back-up behaviour?					
	How adaptable were team members to the changing demands of the situation?					
	Cooperation					
	To what extent were team members working toward the same ends?					
	How effective were FAC/others as a team?					
4.5	Abort mission					
	Communication					
	How effective was information exchange?					5
	Was communication economical?					5
	Coordination					
	How well were team members' knowledge requirements managed?					5
	How well did team members monitor each other's performance?					5
	Cooperation					
	To what extent did team members display mutual trust?					5
5.1	Perform BDA					
	Communication					
	How effective was information exchange?		5	5		5
	Coordination					
	How well were team members' knowledge requirements managed?		5	5		5
5.2	Communicate options with pilot					
	Communication					
	How effective was information exchange?		5			5
	Was information exchange economical?					
	Did closed looped communication go as expected?		5			5
	Coordination					
	How well were team members' knowledge requirements managed?		4			4
	How adaptable were team members to the changing demands of the situation?		5			5
5.3	Situation updates					
	Communication					
	How effective was information exchange?		4			5

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	Was communication economical?		NR			NR
	Did closed looped communication go as expected?		5			5
	Coordination					
	How well were team members' knowledge requirements managed?		4			4
	How well did team members monitor each other's performance?		5			5
	How adaptable were team members to the changing demands of the situation?		NR			NR
	Cooperation					
	To what extent were team members working toward the same ends?		5			5
	How effective were FAC/others as a team?		5			5

Rater 2

Set A: Archer 01 missions (ISR/TIC);

Set B: Skull 21 mission (TIC);

Set C: Machine 41 mission (TIC);

BARS Groups		Multiple Ratings		
		Set A	Set B	Set C
1.1	Understand situation (Blue, Red, White, Brown)			
	Communication			
	How effective was information exchange?	B5;		
	Was communication economical?	B3;		
	Did closed looped communication go as expected?	B4;		
	Coordination			
	How well were team members' knowledge requirements managed?	B4; W4		
	How well did the team members monitor each other's performance?	B4;		
	How adaptable were team members to the changing demands of the situation?			
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			
1.2	Transmit immediate CAS request			
	Communication			

BARS Groups		Multiple Ratings		
		Set A	Set B	Set C
	How effective was information exchange?	4		
	Was communication economical?	4		
	Did closed looped communication go as expected?	4		
	Coordination			
	How well were team members' knowledge requirements managed?			
	How effective was back-up behaviour?	5		
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			
2.1	Receive pilot's scheduled check-in			
	Communication			
	How effective was information exchange?	4	4	
	Was communication economical?	2	4	
	Did closed looped communication go as expected?	4	4	
	Coordination			
	How well were team members' knowledge requirements managed?	4	4	
	How well did team members monitor each other's performance?		4	
	How adaptable were team members to the changing demands of the situation?			
3.1	Communicate options with pilot			
	Communication			
	How effective was information exchange?	4		
	Was information exchange economical?	2		
	Did closed looped communication go as expected?	4		
	Coordination			
	How well were team members' knowledge requirements managed?	3		
	How adaptable were team members to the changing demands of the situation?	5		
3.2	Understand situation (Blue, Red, White, Brown)			
	Communication			
	How effective was information exchange?	B5; W5		
	Was communication economical?	B3; W3		
	Did closed looped communication go as expected?	B4; W4		

	BARS Groups	Multiple Ratings		
		Set A	Set B	Set C
	Coordination			
	How well were team members' knowledge requirements managed?	B4; W4		
	How well did team members monitor each other's performance?			
	How adaptable were team members to the changing demands of the situation?			
	Cooperation			
	To what extent were team members working toward the same ends?	W4;		
	How effective were FAC/others as a team?			
4.1	Transmit CAS brief and communicate remarks			
	Communication			
	How effective was information exchange?			
	Was communication economical?			
	Did closed looped communication go as expected?			
	Coordination			
	How well were team members' knowledge requirements managed?			
	How effective was back-up behaviour?			
	How adaptable were team members to the changing demands of the situation?			
4.2	Transmit talk-on			
	Communication			
	How effective was information exchange?			
	Was communication economical?			
	Did closed looped communication go as expected?			
	Coordination			
	How well were team members' knowledge requirements managed?			
	How well did team members monitor each other's performance?			
	How effective was back-up behaviour?			
	How adaptable were team members to the changing demands of the situation?			
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			
4.3	Deconflict target area			
	Communication			

BARS Groups		Multiple Ratings		
		Set A	Set B	Set C
	How effective was information exchange?	4		
	Was communication economical?	4		
	Did closed looped communication go as expected?	4		
	Coordination			
	How well were team members' knowledge requirements managed?	5		
	How well did team members monitor each other's performance?	4		
	How effective was back-up behaviour?	5		
	How adaptable were team members to the changing demands of the situation?	4		
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			
4.4	Designate target			
	Communication			
	How effective was information exchange?	5	5	
	Was communication economical?	4	4	2
	Did closed looped communication go as expected?	4	5	
	Coordination			
	How well were team members' knowledge requirements managed?			
	How well did team members monitor each other's performance?			
	How effective was back-up behaviour?			
	How adaptable were team members to the changing demands of the situation?			
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			
4.5	Abort mission			
	Communication			
	How effective was information exchange?			5
	Was communication economical?			
	Coordination			
	How well were team members' knowledge requirements managed?			4
	How well did team members monitor each other's performance?			

	BARS Groups	Multiple Ratings		
		Set A	Set B	Set C
	Cooperation			
	To what extent did team members display mutual trust?			
5.1	Perform BDA			
	Communication			
	How effective was information exchange?	4		4
	Coordination			
	How well were team members' knowledge requirements managed?	4		4
5.2	Communicate options with pilot			
	Communication			
	How effective was information exchange?	4		
	Did closed looped communication go as expected?			
	Coordination			
	How well were team members' knowledge requirements managed?	4		
	How adaptable were team members to the changing demands of the situation?			
5.3	Understand situation (Blue, Red, White, Brown)			
	Communication			
	How effective was information exchange?	B4; R4		
	Was communication economical?			
	Did closed looped communication go as expected?			
	Coordination			
	How well were team members' knowledge requirements managed?			
	How well did team members monitor each other's performance?			
	How adaptable were team members to the changing demands of the situation?			
	Cooperation			
	To what extent were team members working toward the same ends?			
	How effective were FAC/others as a team?			

August 09, 2007 (Thursday)

Rater 1

Set A: Pre-TIC (Archer ISR/SOF drop) & TIC; Players are Coy Cdr, FAC, ASOC & Archer.

Set B: Post-TIC

Set C: Machine 1st TIC

Set D: Machine 2nd TIC

Set E: MEDEVAC; Players are FAC, ASOC, Coy Cdr, Clinger

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
1.1	Understand situation updates					
	Communication					
	How effective was information exchange?	5				
	Was communication economical?	4				
	Did closed looped communication go as expected?	5				
	Coordination					
	How well were team members' knowledge requirements managed?	4				
	How well did the team members monitor each other's performance?	3				
	How adaptable were team members to the changing demands of the situation?	4				
	Cooperation					
	To what extent were team members working toward the same ends?	5	4			
	How effective were FAC/others as a team?	5	5			
1.2	Transmit immediate CAS request					
	Communication					
	How effective was information exchange?	5				
	Was communication economical?	4				
	Did closed looped communication go as expected?	NR				
	Coordination					
	How well were team members' knowledge requirements managed?	4				
	How effective was back-up behaviour?	NR				
	Cooperation					
	To what extent were team members working toward the same ends?	5				
	How effective were FAC/others as a team?	5				
2.1	Receive pilot's scheduled check-in					
	Communication					
	How effective was information exchange?	5		5	5	
	Was communication economical?	4		4	4	
	Did closed looped communication go as expected?	5		5	5	

	BARS	Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	Coordination	4		5	5	
	How well were team members' knowledge requirements managed?	5		5	5	
	How well did team members monitor each other's performance?	NR		NR	NR	
	How adaptable were team members to the changing demands of the situation?					
3.1	Communicate options with pilot					
	Communication					
	How effective was information exchange?	5				4
	Was information exchange economical?	3				3
	Did closed looped communication go as expected?	5				5
	Coordination					
	How well were team members' knowledge requirements managed?	4				4
	How adaptable were team members to the changing demands of the situation?	4				NR
3.2	Understand situation updates					
	Communication					
	How effective was information exchange?	5				5
	Was communication economical?	3				3
	Did closed looped communication go as expected?	5				5
	Coordination					
	How well were team members' knowledge requirements managed?	4				3
	How well did team members monitor each other's performance?	3				3
	How adaptable were team members to the changing demands of the situation?	3				3
	Cooperation					
	To what extent were team members working toward the same ends?					
	How effective were FAC/others as a team?	3				3
4.1	Transmit CAS brief and communicate remarks	5				5
	Communication					
	How effective was information exchange?	5		5		
	Was communication economical?	3		3		
	Did closed looped communication go as expected?	5		5		
	Coordination					
	How well were team members' knowledge requirements managed?	5		4		

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	How effective was back-up behaviour?	5		5		
	How adaptable were team members to the changing demands of the situation?	NR		NR		
	Cooperation					
	To what extent were team members working toward the same ends?	5		5		
	How effective were FAC/others as a team?	5		5		
4.2	Transmit talk-on					
	Communication					
	How effective was information exchange?	5		3		
	Was communication economical?	4		2		
	Did closed looped communication go as expected?	5		4		
	Coordination					
	How well were team members' knowledge requirements managed?	4		3		
	How well did team members monitor each other's performance?	5		4		
	How effective was back-up behaviour?	5		5		
	How adaptable were team members to the changing demands of the situation?	4		3		
	Cooperation					
	To what extent were team members working toward the same ends?	5		5		
	How effective were FAC/others as a team?	5		5		
4.3	Deconflict target area					
	Communication					
	How effective was information exchange?					
	Was communication economical?					
	Did closed looped communication go as expected?					
	Coordination					
	How well were team members' knowledge requirements managed?					
	How well did team members monitor each other's performance?					
	How effective was back-up behaviour?					
	How adaptable were team members to the changing demands of the situation?					
	Cooperation					
	To what extent were team members working toward the same ends?					
	How effective were FAC/others as a team?					

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
4.4	Designate target					
	Communication					
	How effective was information exchange?					
	Was communication economical?					
	Did closed looped communication go as expected?					
	Coordination					
	How well were team members' knowledge requirements managed?					
	How well did team members monitor each other's performance?					
	How effective was back-up behaviour?					
	How adaptable were team members to the changing demands of the situation?					
	Cooperation					
	To what extent were team members working toward the same ends?					
	How effective were FAC/others as a team?					
4.5	Abort mission					
	Communication					
	How effective was information exchange?					
	Was communication economical?					
	Coordination					
	How well were team members' knowledge requirements managed?					
	How well did team members monitor each other's performance?					
	Cooperation					
	To what extent did team members display mutual trust?					
5.1	Perform BDA					
	Communication					
	How effective was information exchange?	5		5		
	Coordination					
	How well were team members' knowledge requirements managed?	5		5		
5.2	Communicate options with pilot					
	Communication					
	How effective was information exchange?	5		5		
	Was information exchange economical?					

BARS		Multiple Ratings				
		Set A	Set B	Set C	Set D	Set E
	Did closed looped communication go as expected?	5		5		
	Coordination					
	How well were team members' knowledge requirements managed?	4		3		
	How adaptable were team members to the changing demands of the situation?	NR		4		
5.3	Situation updates					
	Communication					
	How effective was information exchange?	NR		5		
	Was communication economical?			5	3	
	Did closed looped communication go as expected?			5		
	Coordination					
	How well were team members' knowledge requirements managed?			4	3	
	How well did team members monitor each other's performance?			3		
	How adaptable were team members to the changing demands of the situation?			3		
	Cooperation					
	To what extent were team members working toward the same ends?			5		
	How effective were FAC/others as a team?			5		

Rater 2

Set A: Archer 01 (TIC); Players are FAC, Coy Cdr, ASOC, Archer

Set B: Coy Cdr and ASOC;

Set C: Machine 43/44 (ISR – RECCE until bingo fuel); Players are FAC, Coy Cdr, Machine 42/43,

Set D: Clinger (MEDEVAC); Players are FAC, Coy Cdr, ASOC

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
1.1	Understand situation (Blue, Red, White, Brown)				
	Communication				
	How effective was information exchange?	B4; R5; W5	B5;		
	Was communication economical?	B4; W4	B4;		
	Did closed looped communication go as expected?	B4	B4;		
	Coordination				

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
	How well were team members' knowledge requirements managed?	B4;	B4;		
	How well did the team members monitor each other's performance?	B4;	B4;		
	How adaptable were team members to the changing demands of the situation?	B4;	B4;		
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				
1.2	Transmit immediate CAS request				
	Communication				
	How effective was information exchange?	5			
	Was communication economical?	3			
	Did closed looped communication go as expected?	4			
	Coordination				
	How well were team members' knowledge requirements managed?				
	How effective was back-up behaviour?				
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				
2.1	Receive pilot's scheduled check-in				
	Communication				
	How effective was information exchange?	5		3	4
	Was communication economical?	4		3	4
	Did closed looped communication go as expected?	5		3	4
	Coordination				
	How well were team members' knowledge requirements managed?				
	How well did team members monitor each other's performance?				
	How adaptable were team members to the changing demands of the situation?				
3.1	Communicate options with pilot				
	Communication				
	How effective was information exchange?	4		3	
	Was information exchange economical?	3		2	

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
	Did closed looped communication go as expected?	4		3	
	Coordination				
	How well were team members' knowledge requirements managed?				
	How adaptable were team members to the changing demands of the situation?				
3.2	Understand situation (Blue, Red, White, Brown)				
	Communication				
	How effective was information exchange?				
	Was communication economical?				
	Did closed looped communication go as expected?				
	Coordination				
	How well were team members' knowledge requirements managed?				
	How well did team members monitor each other's performance?				
	How adaptable were team members to the changing demands of the situation?				
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				
4.1	Transmit CAS brief and communicate remarks				
	Communication				
	How effective was information exchange?				
	Was communication economical?				
	Did closed looped communication go as expected?				
	Coordination				
	How well were team members' knowledge requirements managed?				
	How effective was back-up behaviour?				
	How adaptable were team members to the changing demands of the situation?				
4.2	Transmit talk-on				
	Communication				
	How effective was information exchange?				
	Was communication economical?				

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
	Did closed looped communication go as expected?				
	Coordination				
	How well were team members' knowledge requirements managed?				
	How well did team members monitor each other's performance?				
	How effective was back-up behaviour?				
	How adaptable were team members to the changing demands of the situation?				
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				
4.3	Deconflict target area				
	Communication				
	How effective was information exchange?	5			
	Was communication economical?	3			
	Did closed looped communication go as expected?	4			
	Coordination				
	How well were team members' knowledge requirements managed?	4			
	How well did team members monitor each other's performance?				
	How effective was back-up behaviour?	4			
	How adaptable were team members to the changing demands of the situation?	4			
	Cooperation				
	To what extent were team members working toward the same ends?	4			
	How effective were FAC/others as a team?	4			
4.4	Designate target				
	Communication				
	How effective was information exchange?	5			
	Was communication economical?	4			
	Did closed looped communication go as expected?	4			
	Coordination				
	How well were team members' knowledge requirements managed?	4			
	How well did team members monitor each other's performance?	4			

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
	How effective was back-up behaviour?	5			
	How adaptable were team members to the changing demands of the situation?	5			
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				
4.5	Abort mission				
	Communication				
	How effective was information exchange?				
	Was communication economical?				
	Cooperation				
	To what extent did team members display mutual trust?				
5.1	Perform BDA				
	Communication				
	How effective was information exchange?	5			
	Coordination				
	How well were team members' knowledge requirements managed?	4			
5.2	Communicate options with pilot				
	Communication				
	How effective was information exchange?	4			
	Did closed looped communication go as expected?	4			
	Coordination				
	How well were team members' knowledge requirements managed?	4			
	How adaptable were team members to the changing demands of the situation?	3			
5.3	Understand situation (Blue, Red, White, Brown)				
	Communication				
	How effective was information exchange?	B5; R4			
	Was communication economical?	B3; R4			
	Did closed looped communication go as expected?	B4;			
	Coordination				
	How well were team members' knowledge requirements managed?				

BARS Groups		Ratings			
		Set A	Set B	Set C	Set D
	How well did team members monitor each other's performance?				
	How adaptable were team members to the changing demands of the situation?	B4;			
	Cooperation				
	To what extent were team members working toward the same ends?				
	How effective were FAC/others as a team?				

August 10, 2007 (Friday)

Rater 1

Multiple ratings of BARS were collected and are organised here accordingly from Set A to Set F. Each Set is defined next.

Set A: Main mission (ASOC check-in, wait for pilots, ISR with NOMAD); Players are FAC, Coy Cdr, ASOC, NOMAD.

Set B: MEDEVAC before TIC; Players are FAC, Coy Cdr, Clinger, ASOC.

Set C: Machine 1st attack.

Set D: Machine 2nd attack.

Set E: Machine 3rd drop.

Set F: Machine friendly talk-on.

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
1.1	Understand situation updates						
	Communication						
	How effective was information exchange?	5					
	Was communication economical?	4					
	Did closed looped communication go as expected?	4					
	Coordination						
	How well were team members' knowledge requirements managed?	4					
	How well did the team members monitor each other's performance?	5					
	How adaptable were team members to the changing demands of the situation?	4					
	Cooperation						

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
	To what extent were team members working toward the same ends?	4					
	How effective were FAC/others as a team?	5					
1.2	Transmit immediate CAS request						
	Communication						
	How effective was information exchange?	1	5				
	Was communication economical?	3	3				
	Did closed looped communication go as expected?	5	5				
	Coordination						
	How well were team members' knowledge requirements managed?	5	5				
	How effective was back-up behaviour?	4	4				
	Cooperation						
	To what extent were team members working toward the same ends?	5	5				
	How effective were FAC/others as a team?	5	5				
2.1	Receive pilot's scheduled check-in						
	Communication						
	How effective was information exchange?	4		3			
	Was communication economical?	4		4			
	Did closed looped communication go as expected?	5		5			
	Coordination						
	How well were team members' knowledge requirements managed?	5		4			
	How well did team members monitor each other's performance?	5		5			
	How adaptable were team members to the changing demands of the situation?	5		5			
3.1	Communicate options with pilot						
	Communication						
	How effective was information exchange?	5		5			
	Was information exchange economical?	5		3			
	Did closed looped communication go as expected?	5		5			
	Coordination						
	How well were team members' knowledge requirements managed?	5		4			
	How adaptable were team members to the changing demands of the situation?	5		4			

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
3.2	Understand situation updates						
	Communication						
	How effective was information exchange?	5		3			
	Was communication economical?	4		4			
	Did closed looped communication go as expected?	5		5			
	Coordination						
	How well were team members' knowledge requirements managed?	4		4			
	How well did team members monitor each other's performance?	5		5			
	How adaptable were team members to the changing demands of the situation?	4		4			
	Cooperation						
	To what extent were team members working toward the same ends?	4		4			
	How effective were FAC/others as a team?	5		5			
4.1	Transmit CAS brief and communicate remarks						
	Communication						
	How effective was information exchange?			3	4		
	Was communication economical?			5	5		
	Did closed looped communication go as expected?			5	5		
	Coordination						
	How well were team members' knowledge requirements managed?			4	5		
	How effective was back-up behaviour?			5	5		
	How adaptable were team members to the changing demands of the situation?			4	4		
	Cooperation						
	To what extent were team members working toward the same ends?			5	5		
	How effective were FAC/others as a team?			5	5		
4.2	Transmit talk-on						
	Communication						
	How effective was information exchange?			5	4	5	5
	Was communication economical?			4	4	3	NR
	Did closed looped communication go as expected?			5	5	5	5
	Coordination						

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
	How well were team members' knowledge requirements managed?			4	3	3	
	How well did team members monitor each other's performance?			5	4	3	
	How effective was back-up behaviour?			5	5	5	
	How adaptable were team members to the changing demands of the situation?			5	4	NR	
	Cooperation						
	To what extent were team members working toward the same ends?			5	5	5	
	How effective were FAC/others as a team?			5	5	5	
4.3	Deconflict target area						
	Communication						
	How effective was information exchange?	5	5				
	Was communication economical?	5	5				
	Did closed looped communication go as expected?	5	5				
	Coordination						
	How well were team members' knowledge requirements managed?	4					
	How well did team members monitor each other's performance?	4					
	How effective was back-up behaviour?						
	How adaptable were team members to the changing demands of the situation?						
	Cooperation						
	To what extent were team members working toward the same ends?						
	How effective were FAC/others as a team?						
4.4	Designate target						
	Communication						
	How effective was information exchange?			5			
	Was communication economical?			5			
	Did closed looped communication go as expected?			5			
	Coordination						
	How well were team members' knowledge requirements managed?			4			
	How well did team members monitor each other's performance?			5			
	How effective was back-up behaviour?			5			

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
	How adaptable were team members to the changing demands of the situation?			5			
	Cooperation						
	To what extent were team members working toward the same ends?			NR			
	How effective were FAC/others as a team?			NR			
4.5	Abort mission						
	Communication						
	How effective was information exchange?					5	
	Was communication economical?					5	
	Coordination						
	How well were team members' knowledge requirements managed?					4	
	How well did team members monitor each other's performance?					5	
	Cooperation						
	To what extent did team members display mutual trust?					5	
5.1	Perform BDA						
	Communication						
	How effective was information exchange?			5	5	5	
	Coordination						
	How well were team members' knowledge requirements managed?			5	5	5	
5.2	Communicate options with pilot						
	Communication						
	How effective was information exchange?			5	NR	3	
	Was information exchange economical?						
	Did closed looped communication go as expected?			5	NR	5	
	Coordination						
	How well were team members' knowledge requirements managed?			4	4	4	
	How adaptable were team members to the changing demands of the situation?			4	NR	NR	
5.3	Situation updates						
	Communication						
	How effective was information exchange?	5		5	5	3	
	Was communication economical?	4		4	4	4	

BARS Groups		Multiple Ratings					
		Set A	Set B	Set C	Set D	Set E	Set F
	Did closed looped communication go as expected?	5		5	5	5	
	Coordination						
	How well were team members' knowledge requirements managed?					4	
	How well did team members monitor each other's performance?						
	How adaptable were team members to the changing demands of the situation?						
	Cooperation						
	To what extent were team members working toward the same ends?		4			5	
	How effective were FAC/others as a team?					5	

Rater 2

Multiple ratings of BARS were collected and are organised here accordingly as Set A and Set B. Each Set is defined next.

Set A: Main mission (ASOC check-in, wait for pilots, ISR with NOMAD); Players are FAC, Coy Cdr, ASOC, NOMAD.

Set B: Players are FAC, Machine 41, Machine 42.

BARS Groups		Multiple Ratings	
		Set A	Set B
1.1	Understand situation (Blue, Red, White, Brown)		
	Communication		
	How effective was information exchange?		
	Was communication economical?		
	Did closed looped communication go as expected?		
	Coordination		
	How well were team members' knowledge requirements managed?		
	How well did the team members monitor each other's performance?		
	How adaptable were team members to the changing demands of the situation?		
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		
1.2	Transmit immediate CAS request		

	BARS Groups	Multiple Ratings	
		Set A	Set B
	Communication		
	How effective was information exchange?	4	
	Was communication economical?	3	
	Did closed looped communication go as expected?	3	
	Coordination		
	How well were team members' knowledge requirements managed?		
	How effective was back-up behaviour?		
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		
2.1	Receive pilot's scheduled check-in		
	Communication		
	How effective was information exchange?	4	4
	Was communication economical?	4	4
	Did closed looped communication go as expected?	4	4
	Coordination		
	How well were team members' knowledge requirements managed?	4	4
	How well did team members monitor each other's performance?	4	3
	How adaptable were team members to the changing demands of the situation?	5	4
3.1	Communicate options with pilot		
	Communication		
	How effective was information exchange?	4	
	Was information exchange economical?	4	
	Did closed looped communication go as expected?	4	
	Coordination		
	How well were team members' knowledge requirements managed?	4	
	How adaptable were team members to the changing demands of the situation?	4	
3.2	Understand situation (Blue, Red, White, Brown)		
	Communication		
	How effective was information exchange?	B4; R4; W4;	
	Was communication economical?	B4; R4; W4;	

BARS Groups		Multiple Ratings	
		Set A	Set B
	Did closed looped communication go as expected?	B4; R4; W4;	
	Coordination		
	How well were team members' knowledge requirements managed?	B4; R4;	
	How well did team members monitor each other's performance?	B4; R4;	
	How adaptable were team members to the changing demands of the situation?	B4; R4;	
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		
4.1	Transmit CAS brief and communicate remarks		
	Communication		
	How effective was information exchange?		
	Was communication economical?		
	Did closed looped communication go as expected?		
	Coordination		
	How well were team members' knowledge requirements managed?		
	How effective was back-up behaviour?		
	How adaptable were team members to the changing demands of the situation?		
4.2	Transmit talk-on		
	Communication		
	How effective was information exchange?		
	Was communication economical?		
	Did closed looped communication go as expected?		
	Coordination		
	How well were team members' knowledge requirements managed?		
	How well did team members monitor each other's performance?		
	How effective was back-up behaviour?		
	How adaptable were team members to the changing demands of the situation?		
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		
4.3	Deconflict target area		

	BARS Groups	Multiple Ratings	
		Set A	Set B
	Communication		
	How effective was information exchange?	4	
	Was communication economical?	2	
	Did closed looped communication go as expected?	3	
	Coordination		
	How well were team members' knowledge requirements managed?	5	
	How well did team members monitor each other's performance?	4	
	How effective was back-up behaviour?	5	
	How adaptable were team members to the changing demands of the situation?	4	
	Cooperation		
	To what extent were team members working toward the same ends?	4	
	How effective were FAC/others as a team?	4	
4.4	Designate target		
	Communication		
	How effective was information exchange?	5	
	Was communication economical?	3	
	Did closed looped communication go as expected?	4	
	Coordination		
	How well were team members' knowledge requirements managed?	4	
	How well did team members monitor each other's performance?	4	
	How effective was back-up behaviour?		
	How adaptable were team members to the changing demands of the situation?	4	
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		
4.5	Abort mission		
	Communication		
	How effective was information exchange?	5	
	Was communication economical?	5	
	Coordination		
	How well were team members' knowledge requirements managed?	5	

BARS Groups		Multiple Ratings	
		Set A	Set B
	How well did team members monitor each other's performance?	5	
	Cooperation		
	To what extent did team members display mutual trust?	5	
5.1	Perform BDA		
	Communication		
	How effective was information exchange?	5	5
	Coordination		
	How well were team members' knowledge requirements managed?	5	5
5.2	Communicate options with pilot		
	Communication		
	How effective was information exchange?	4	
	Did closed looped communication go as expected?	4	
	Coordination		
	How well were team members' knowledge requirements managed?		
	How adaptable were team members to the changing demands of the situation?		
5.3	Understand situation (Blue, Red, White, Brown)		
	Communication		
	How effective was information exchange?	B4; R4;	
	Was communication economical?	B3; R3;	
	Did closed looped communication go as expected?	B4; R4;	
	Coordination		
	How well were team members' knowledge requirements managed?		
	How well did team members monitor each other's performance?		
	How adaptable were team members to the changing demands of the situation?		
	Cooperation		
	To what extent were team members working toward the same ends?		
	How effective were FAC/others as a team?		

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(U) The role of the FAC in Close Air Support (CAS) is critical, as their performance can mean the difference between effective CAS and fratricide. Effective live training opportunities in Canada for FACs are limited as they require large supporting teams (involving among others pilots, the supported commander, higher air command, etc.). Distributed simulation may be a useful tool for generating and sustaining FAC capabilities in the Canadian Forces (CF). However, in order to establish the effectiveness of such training, it is necessary to define the tasks the FAC and the CAS team perform, and to identify suitable metrics for assessing the team's performance.

To this end, a Hierarchical Task Analysis of CAS was performed. The analysis was used to develop a series of Behaviourally Anchored Rating Scales (BARS) that captured team performance in CAS. These BARS were trialed during Exercise Northern Goshawk, a distributed simulation of a joint coalition operation involving research partners from DRDC Toronto, the United States and the United Kingdom. The exercise revealed a number of challenges affecting the application of the instrument as well as the interpretation of the ratings obtained with it. Thus, this report does not provide analysis of the ratings. However, a number of possible solutions to the challenges are discussed. The report also makes a number of recommendations for improving the instrument prior to its application in future distributed simulation exercises. The principal ones are: future raters should be adequately trained on using the instrument, and its inter−rater reliability should be assessed and refined. An improved BARS instrument will aid in the development of effective distributed training simulations in support of FAC capability development in the CF.

(U) Le rôle du Contrôleur Aérien Avancé (CAA) dans l'appui aérien rapproché (AAR) est essentiel, puisque son rendement peut faire toute la différence entre l'AAR efficace et le fratricide. Les possibilités d'entraînement efficace en direct au Canada pour les CAA sont limitées puisqu'elles nécessitent de grandes équipes de soutien (auxquelles participent notamment les pilotes, le commandant appuyé, le commandement aérien supérieur, etc.). La simulation répartie peut être un outil utile pour créer et maintenir des capacités de CAA dans les Forces canadiennes (FC). Cependant, afin d'établir l'efficacité d'une telle formation, il est nécessaire de définir les tâches qu'accomplissent le CAA et l'équipe d'AAR, ainsi que de déterminer les mesures adéquates pour évaluer le rendement de l'équipe.

À cette fin, on a effectué une analyse hiérarchique des tâches de l'AAR. L'analyse a été utilisée pour élaborer une série d'échelles d'évaluation fondée sur le comportement (EEFC) conçues pour enregistrer le rendement d'équipe relativement à l'AAR. Ces EEFC ont fait l'objet d'essais pendant l'exercice Northern Goshawk, une simulation répartie d'une opération coalisée interarmées à laquelle ont participé des partenaires de recherche de RDDC Toronto, des États−Unis et du Royaume−Uni. L'exercice a révélé un certain nombre de problèmes touchant l'application de l'instrument ainsi que l'interprétation des évaluations que l'on obtient. Le présent rapport ne fournit donc pas d'analyse des évaluations. Toutefois, on y discute de nombreuses solutions possibles. Le rapport présente également un certain nombre de recommandations visant à améliorer l'instrument avant son application aux exercices futurs de simulation répartie. Les recommandations principales sont les suivantes : les évaluateurs futurs doivent suivre une formation adéquate sur l'utilisation de l'instrument, et le coefficient d'objectivité de l'instrument doit être évalué et amélioré. Un instrument EEFC amélioré aidera à

l'élaboration de simulations réparties de formation efficaces à l'appui du développement des capacités du CAA dans les FC.

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(U) Close Air Support; Forward Air Controller; BARS; HTA; Team Cognition; Fratricide; Training; Distributed Mission Operations